

# **INDEPENDENT ORBITER ASSESSMENT**

## **ANALYSIS OF THE CREW EQUIPMENT SUBSYSTEM**

**2 NOVEMBER 1987**



MCDONNELL DOUGLAS ASTRONAUTICS COMPANY  
HOUSTON DIVISION

SPACE TRANSPORTATION SYSTEM ENGINEERING AND OPERATIONS SUPPORT

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INDEPENDENT ORBITER ASSESSMENT  
ANALYSIS OF THE CREW EQUIPMENT SUBSYSTEM

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CONTENTS	Page
<b>1.0 EXECUTIVE SUMMARY</b>	<b>1</b>
<b>2.0 INTRODUCTION</b>	<b>4</b>
<b>2.1 Purpose</b>	<b>4</b>
<b>2.2 Scope</b>	<b>4</b>
<b>2.3 Analysis Approach</b>	<b>4</b>
<b>2.4 Crew Equipment Ground Rules and Assumptions</b>	<b>5</b>
<b>3.0 SUBSYSTEM DESCRIPTION</b>	<b>6</b>
<b>3.1 Design and Function</b>	<b>6</b>
<b>3.2 Interfaces and Locations</b>	<b>31</b>
<b>3.3 Hierarchy</b>	<b>31</b>
<b>4.0 ANALYSIS RESULTS</b>	<b>43</b>
<b>4.1 - EVA Equipment</b>	<b>43</b>
<b>4.2 - EVA Tethers</b>	<b>44</b>
<b>4.3 - EVA Tools</b>	<b>45</b>
<b>4.4 - IVA Tools</b>	<b>46</b>
<b>4.5 - Food Assemblies</b>	<b>47</b>
<b>4.6 - Orbiter Hardware</b>	<b>47</b>
<b>5.0 REFERENCES</b>	<b>48</b>
<b>APPENDIX A ACRONYMS</b>	<b>A-1</b>
<b>APPENDIX B DEFINITIONS, GROUND RULES, AND ASSUMPTIONS</b>	<b>B-1</b>
<b>B.1 Definitions</b>	<b>B-2</b>
<b>B.2 Project Level Ground Rules and Assumptions</b>	<b>B-4</b>
<b>B.3 Subsystem Specific Ground Rules and Assumptions</b>	<b>B-6</b>
<b>APPENDIX C DETAILED ANALYSIS</b>	<b>C-1</b>
<b>C.1 EVA Equipment</b>	<b>C-13</b>
<b>C.2 EVA Tethers</b>	<b>C-76</b>
<b>C.3 EVA Tools</b>	<b>C-107</b>
<b>C.4 IVA Tools</b>	<b>C-195</b>
<b>C.5 Food Assemblies</b>	<b>C-216</b>
<b>C.6 Orbiter Hardware</b>	<b>C-323</b>
<b>APPENDIX D POTENTIAL CRITICAL ITEMS</b>	<b>D-1</b>

## List of Figures

	Page
Figure 1:	CREW EQUIPMENT OVERVIEW ANALYSIS SUMMARY 3
Figure 2:	CREW EQUIPMENT DISTRIBUTION 7
Figure 3:	EMU SCISSORS 6
Figure 4:	EMU LIGHT ASSEMBLY 8
Figure 5:	OPERATIONAL BIOINSTRUMENTATION SYSTEM 9
Figure 6:	EVA PORTABLE FOOT RESTRAINT 10
Figure 7:	EVA SLIDEWIRE 11
Figure 8:	35-FOOT SAFETY TETHER 12
Figure 9:	WAIST TETHER 13
Figure 10:	TUBE CUTTER 13
Figure 11:	CENTERLINE LATCH BYPASS TOOL 14
Figure 12:	THREE-POINT LATCH TOOL 15
Figure 13:	EVA WINCH AND MOUNTING ASSEMBLY 16
Figure 14:	RMS EVA WINCH ADAPTER ASSEMBLY 16
Figure 15:	PAYLOAD RETENTION DEVICE 17
Figure 16:	EVA CABLE CUTTER 18
Figure 17:	SNATCH BLOCK ASSEMBLY 18
Figure 18:	TURNBUCKLE 19
Figure 19:	LOCKER REMOVAL TOOL 20
Figure 20:	IFM BREAKOUT BOX 20
Figure 21:	GALLEY ASSEMBLY 22
Figure 22:	OPERATIONAL WATER DISPENSER ASSEMBLY 23
Figure 23:	CONTINGENCY WATER DISPENSER ASSEMBLY 24
Figure 24:	SLEEP STATIONS AND RESTRAINTS 25
Figure 25:	SIDE HATCH SAFETY LOCK 26
Figure 26:	LOCKERS 27
Figure 27:	TREADMILL 28
Figure 28:	CREW OPTICAL ALIGNMENT SIGHT 30
Figure 29:	CREW EQUIPMENT HIERARCHY 32
Figure 30:	EMU LIGHT ASSEMBLY HIERARCHY 33
Figure 31:	EVA TETHERS HIERARCHY 34
Figure 32:	PAYLOAD BAY DOOR TOOLS HIERARCHY 35
Figure 33:	PSA TOOLS HIERARCHY 36
Figure 34:	RMS TOOLS HIERARCHY 37
Figure 35:	IFM BREAKOUT BOX HIERARCHY 38
Figure 36:	GALLEY HIERARCHY 39
Figure 37:	OPERATIONAL WATER DISPENSER ASSEMBLY HIERARCHY 40
Figure 38:	ORBITER HARDWARE HIERARCHY 41
Figure 39:	CREW OPTICAL ALIGNMENT SIGHT HIERARCHY 42

LIST OF TABLES

		PAGE
TABLE I:	SUMMARY OF CREW EQUIPMENT FAILURE MODES AND CRITICALITIES	43
TABLE II:	SUMMARY OF CREW EQUIPMENT POTENTIAL CRITICAL ITEMS	43
TABLE III:	SUMMARY OF EVA EQUIPMENT FAILURE MODES AND CRITICALITIES	44
TABLE IV:	SUMMARY OF EVA TETHER FAILURE MODES AND CRITICALITIES	44
TABLE V:	SUMMARY OF EVA TETHER POTENTIAL CRITICAL ITEMS	44
TABLE VI:	SUMMARY OF EVA TOOL FAILURE MODES AND CRITICALITIES	45
TABLE VII:	SUMMARY OF EVA TOOL FAILURE MODES AND CRITICALITIES	46
TABLE VIII:	SUMMARY OF IVA TOOL FAILURE MODES AND CRITICALITIES	46
TABLE IX:	SUMMARY OF FOOD ASSEMBLY FAILURE MODES AND CRITICALITIES	47
TABLE X:	SUMMARY OF ORBITER HARDWARE FAILURE MODES AND CRITICALITIES	47



Independent Orbiter Assessment  
Analysis of the Crew Equipment Subsystem

## 1.0 EXECUTIVE SUMMARY

The McDonnell Douglas Astronautics Company (MDAC) was selected in June 1986 to perform an Independent Orbiter Assessment (IOA) of the Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL). Direction was given by the STS Orbiter and GFE Projects Office to perform the hardware analysis using the instructions and ground rules defined in NSTS 22206, Instructions for Preparation of FMEA and CIL, Change 2, 6 April 1987. The IOA approach features a top-down analysis of the hardware to determine failure modes, criticality, and potential critical items. To preserve independence, this analysis was accomplished without reliance upon the results contained within the NASA FMEA/CIL documentation. This report documents (Appendix C) the independent analysis results corresponding to the Orbiter crew equipment hardware.

The analysis was performed on only a subset of the crew equipment. This subset was agreed upon during negotiation between MDAC and the STS Orbiter and GFE Projects Offices. The subset includes crew equipment which meets the following criteria: (1) normally manifested on every flight; (2) has received final design approval; and (3) is covered by a NASA FMEA/CIL.

The IOA analysis process utilized available crew equipment hardware drawings and schematics for defining hardware assemblies, components, and hardware items. A complete list of reference documents and drawings can be found in Section 5.0. Each level of hardware was evaluated and analyzed for possible failure modes and effects. Criticality was assigned based upon the severity of the effect for each failure mode.

Figure 1 presents a summary of the failure criticalities for each of the six major subdivisions of the crew equipment. A summary of the number of failure modes, by criticality, is also presented below with Hardware (HW) criticality first and Functional (F) criticality second.

Summary of CREW EQUIPMENT Failure Modes By Criticality (HW/F)							
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
Number:	33	42	1	19	67	190	352

For each failure mode identified, the criticality and redundancy screens were examined to identify critical items. A summary of Potential Critical Items (PCIs) is presented as follows:

Summary of CREW EQUIPMENT Potential Critical Items (HW/F)						
Criticality:	1/1	2/1R	2/2	3/1R	3/2R	TOTAL
Number:	33	42	1	2	0	78

Of the 352 failure modes analyzed, 78 were determined to be PCIs.

# CREW EQUIPMENT OVERVIEW ANALYSIS SUMMARY

CREW EQUIPMENT ANALYSIS SUMMARY					
	CRIT.	# FM	# PCI	CRIT.	# FM
EVA EQUIP.	1/1	0	0	1/1	12
	2/1R	0	0	2/1R	4
	2/2	0	0	2/2	1
	3/1R	0	0	3/1R	1
	3/2R	40	0	3/2R	2
	3/3	23	0	3/3	11
EVA TETHERS	1/1	1	1	2/1R	12
	2/1R	0	0	2/2	1
	2/2	0	0	3/1R	1
	3/1R	0	0	3/2R	0
	3/3	0	0	3/3	0
EVA TOOLS	1/1	21	21	2/1R	37
	2/1R	37	37	2/2	0
	2/2	0	0	3/1R	10
	3/1R	3	2	3/2R	0
	3/2R	4	0	3/3	10
IVA TOOLS	1/1	1	0	2/1R	1
	2/1R	0	1	2/2	0
	2/2	0	0	3/1R	0
	3/1R	0	0	3/2R	0
	3/3	0	0	3/3	0
FOOD ASSY.	1/1	0	0	2/1R	0
	2/1R	0	0	2/2	0
	2/2	0	0	3/1R	5
	3/1R	0	0	3/2R	0
	3/3	0	0	3/3	37
ORBITER HW.	1/1	0	0	2/1R	0
	2/1R	0	0	2/2	0
	2/2	0	0	3/1R	0
	3/1R	0	0	3/2R	0
	3/3	0	0	3/3	0

Figure 1: Crew Equipment Overview Analysis Summary

## **2.0 INTRODUCTION**

### **2.1 Purpose**

The 51-L Challenger accident prompted the NASA to readdress safety policies, concepts, and rationale being used in the National Space Transportation System (NSTS). The NSTS Office has undertaken the task of reevaluating the FMEA/CIL for the Space Shuttle design. The MDAC is providing an independent assessment of the Orbiter FMEA/CIL reevaluation results for completeness and technical accuracy.

### **2.2 Scope**

The scope of the independent FMEA/CIL assessment activity encompasses those Shuttle Orbiter subsystems and GFE hardware identified in the Space Shuttle Independent FMEA/CIL Assessment Contractor Statement of Work. Each subsystem analysis addresses hardware, functions, internal and external interfaces, and operational requirements for all mission phases.

### **2.3 Analysis Approach**

The independent analysis approach is a top-down analysis utilizing as-built drawings to breakdown the respective subsystem into components and low-level hardware items. Each hardware item is evaluated for failure mode, effects, and criticality. These data are documented in the respective subsystem analysis report, and are used to assess the NASA and Prime Contractor FMEA/CIL reevaluation results. The IOA analysis approach is summarized in the following Steps 1.0 through 3.0. Step 4.0 summarizes the assessment of the NASA and Prime Contractor FMEAs/CILs that is performed and documented at a later date.

#### **Step 1.0 Subsystem Familiarization**

- 1.1 Define subsystem functions
- 1.2 Define subsystem components
- 1.3 Define subsystem specific ground rules and assumptions

#### **Step 2.0 Define subsystem analysis diagram**

- 2.1 Define subsystem
- 2.2 Define major assemblies
- 2.3 Develop detailed subsystem representations

#### **Step 3.0 Failure events definition**

- 3.1 Construct matrix of failure modes
- 3.2 Document IOA analysis results

#### **Step 4.0 Compare IOA analysis data to NASA FMEA/CIL**

- 4.1 Resolve differences
- 4.2 Review in-house
- 4.3 Document assessment issues
- 4.4 Forward findings to Project Manager

#### **2.4 Crew Equipment Ground Rules and Assumptions**

The crew equipment ground rules and assumptions used in the IOA are defined in Appendix B. The subsystem specific ground rules were defined to provide necessary additions and clarifications to the ground rules and assumptions contained in NSTS 22206.

## **3.0 SUBSYSTEM DESCRIPTIONS**

### **3.1 Design and Function**

The crew equipment items examined during the Independent Orbiter Assessment project comprise a subset of the total list of crew equipment. The items were chosen through MDAC/NASA negotiation and meet the following criteria: (1) normally manifested on every flight; (2) in a final approved design configuration; (3) have a NASA performed FMEA/CIL.

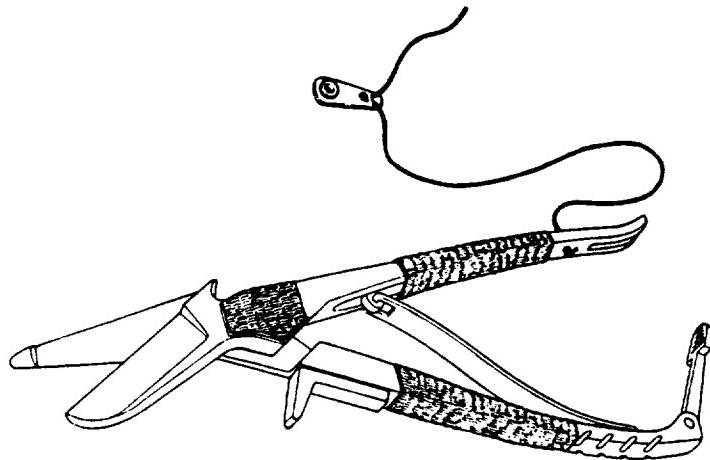
Once the total list of crew equipment items was determined, a logical grouping of the items was made. These groupings are based on usage or location during usage. The overall distribution of the crew equipment is shown in Figure 2. Detailed system breakdowns are included in the following sections.

#### **3.1.1 EVA EQUIPMENT**

##### **EMU Scissors**

The EMU scissors are modified stainless steel surgical scissors used to cut thermal blankets, wires, tethers, etc. They are stowed in a pocket on the right leg of the lower torso and are tethered in place. Once removed from the EMU pocket they are extremely difficult for the EMU crewmember to replace.

The EMU scissors are shown in Figure 3.



**Figure 3: EMU Scissors**

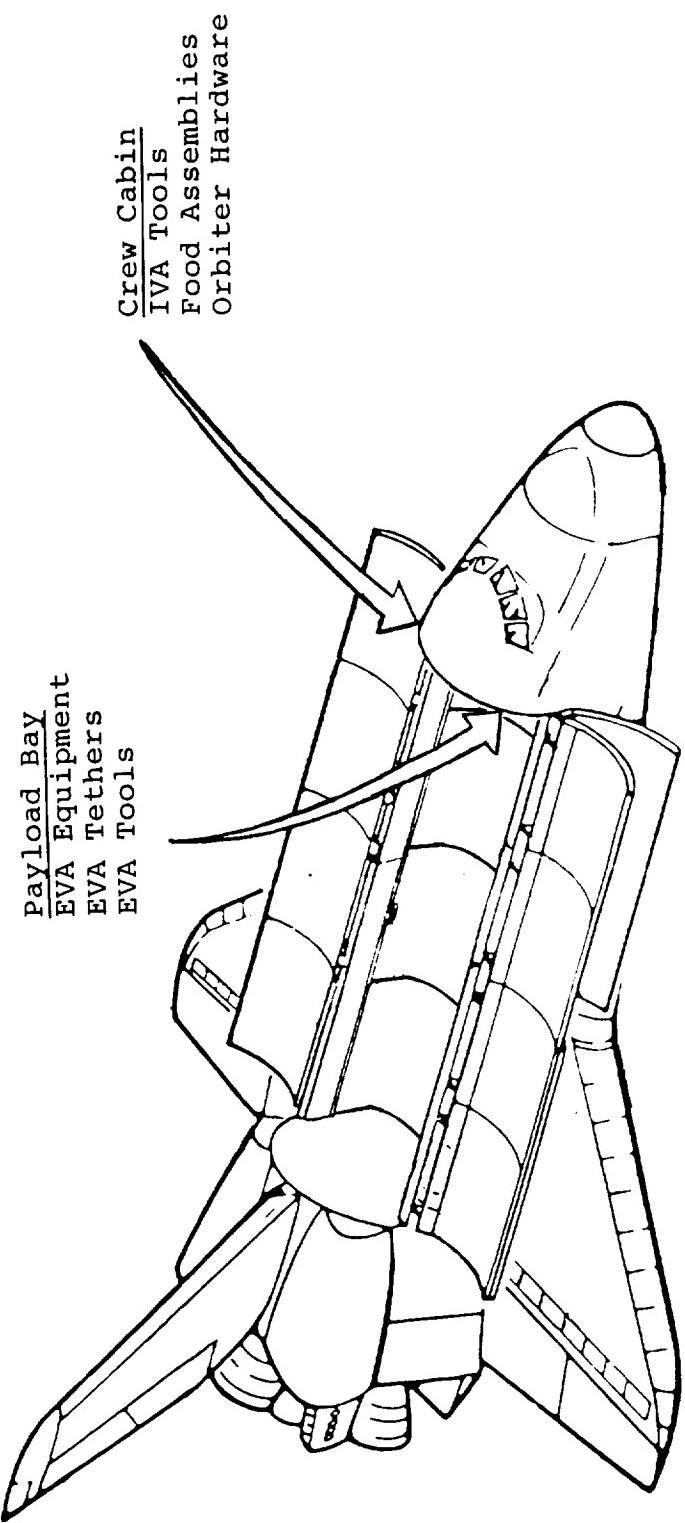


Figure 2: Crew Equipment Distribution

### EMU LIGHT ASSEMBLY

The Extravehicular Mobility Unit (EMU) light assembly provides a crewmember with portable lighting during an EVA task. These lights are useful in providing illumination during the 45 minutes of darkness of each orbit. The assembly contains two independent lamp modules connected by a cross member as shown in Figure 4.

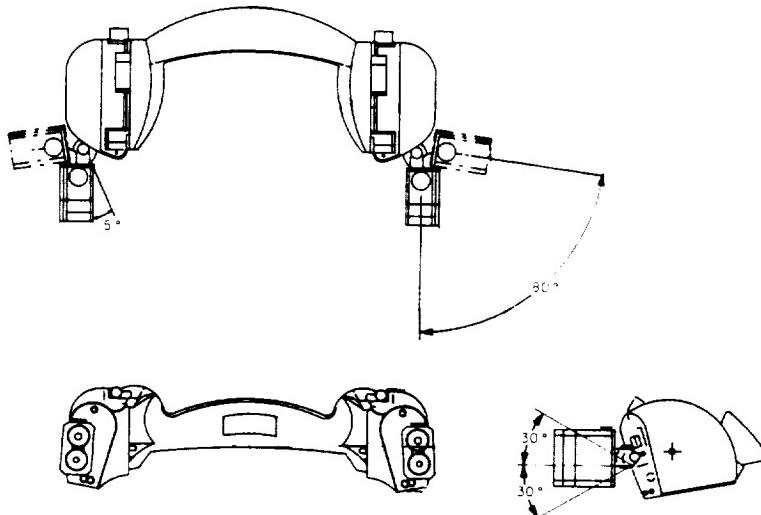


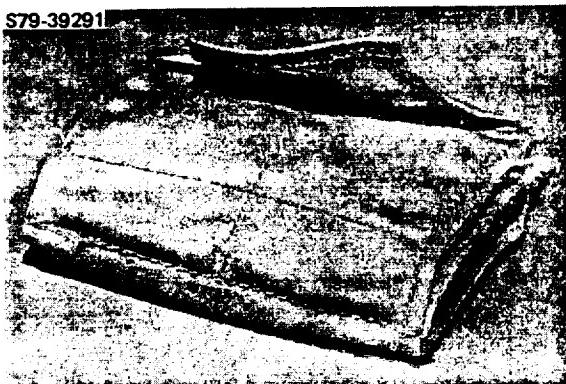
Figure 4: EMU Light Assembly

Each side contains a battery module, two lamps, a switch, and a sequencing circuit (powered by four small watch-sized batteries). The EMU lights attach to the helmet with simple latches. On the EMU lights, each lamp module has a left-right swing angle of 85 degrees (5 degrees towards the helmet and 80 degrees away from the helmet) and an up-down swing angle of 60 degrees (30 degrees up and 30 degrees down). The switch and sequencing circuit provide one-hand operation of the lamp module. Repeatedly depressing the switch sequences the upper lamp on, the lower lamp on, both lamps on, both lamps off. Battery thermal constraints limit dual lamp operation to short periods of time.

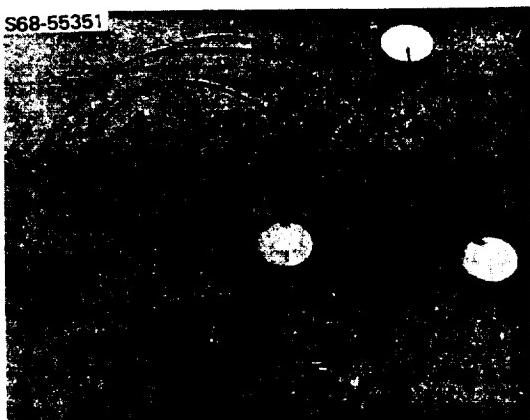
Two EMU light battery modules are required to supply the power for the EMU lights (one per side). Each EMU light battery module provides 5 watts to power two bulbs on one side of the EMU light assembly for 3 hours or 2.5 watts to power one bulb on one side for 6 hours. A built-in fuse protects against inadvertent shorting of the contacts. Twelve EMU light batteries are stored on-board for each flight. Each battery module is replaced prior to each EVA.

## OPERATIONAL BIOINSTRUMENTATION SYSTEM

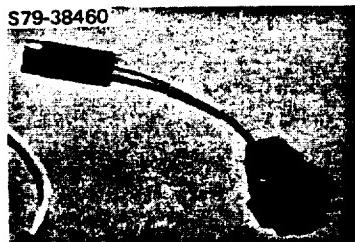
The Operational Bioinstrumentation System (OBS) provides an amplified electrocardiogram analog signal from crewmembers aboard the Orbiter to the Orbiter avionics multiplexer/demultiplexer where it is converted from analog to digital data. It is then transmitted to the ground in real time or stored on tape for dump or postflight return. The major components of the OBS are a biomed belt with signal conditioner, electrode harness, cables and electrode donning kit as shown in Figure 5.



ELECTRODE DONNING KIT



ELECTRODE HARNESS



EVA BIOMED CABLE



SIGNAL CONDITIONER

Figure 5: Operational Bioinstrumentation System

Use of the OBS is limited to extravehicular activity unless intravehicular activity use is requested by the Flight Surgeon. In case of illness, the Flight Surgeon may request that the OBS be donned for a period of time. In this event, the OBS will be donned and the data will be transmitted in real time or recorded and dumped in near-real time. A spare OBS including an Orbiter panel cable is always flown in the medical kit locker.

### EVA PORTABLE FOOT RESTRAINT

The portable foot restraint (PFR) is a working platform which restrains the crewmember during the performance of EVA tasks. The platform consists of a system of toe guides and heel clips which interface with the EMU boots. The PFR is shown in Figure 6. A two-axis (roll and pitch) gimbal system with lock knobs is provided for adjustment and positioning. A probe enables the PFR assembly to interface with the worksite at the PFR socket, where yaw adjustment is available.

The PFR was originally designed to provide Space Shuttle EVA crewmembers with a contingency restraint system for performing EVA work tasks and door latch repairs on or about the forward and aft bulkhead and along the centerline door latches of the payload bay. As EVA operations increased in frequency, new applications for its use were identified and improvements were made in the design to minimize set-up and adjustment times as well as to increase the operational work load limits from 25 to 100 pounds. Spring-loaded lock knobs have been incorporated to prevent inadvertent unlocking of the gimbal system.

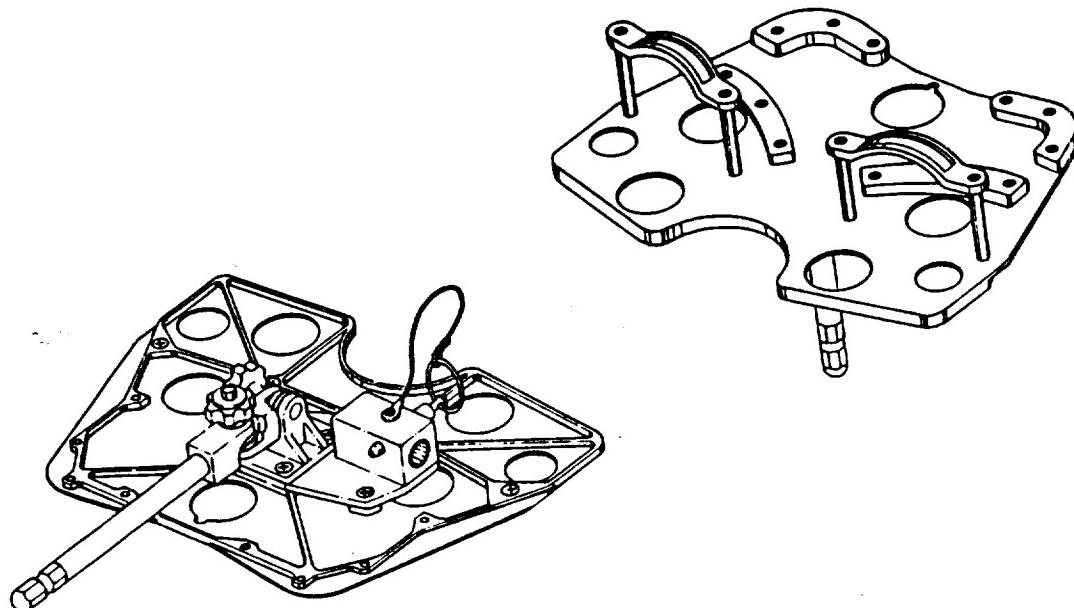


Figure 6: Portable Foot Restraint

### 3.1.2 EVA TETHERS

#### EVA SLIDEWIRE ASSEMBLY

The EVA slidewire assembly consists of a Kevlar rope attached to support structures at the forward and aft ends of the payload bay doors. See Figure 7. There are slidewire assemblies on both the port and starboard sides of the Orbiter.

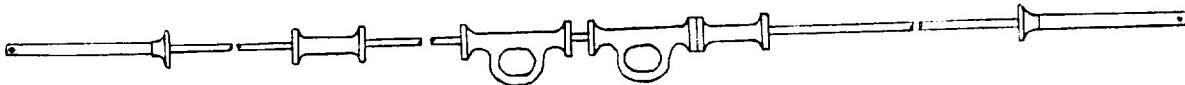


Figure 7: EVA Slidewire

The purpose of the slidewire assembly is to provide a method of connecting an EVA crewmember to the Orbiter, for safety considerations, but still allow freedom of movement throughout the payload bay. To accomplish this purpose, the slidewire is equipped with "slides" which are attached to the rope. The EVA crewman attaches a tether hook, usually one end of the 35-foot waist tether, to the slide which then moves back and forth along the slidewire. This allows the crewman to maneuver around the payload bay, but still remain attached to the Orbiter structure.

The slidewire assembly support structure consists of a yoke, a link, a support, and various fastenings designed to equalize the loads. In the event of a jam in the support mechanism, a quick disconnect pin provides a method of releasing the structure and releasing the jam.

End fittings attach the slidewire to the support structure. The slides are prevented from contacting these end fittings by means of stops which are permanently mounted on the slidewire.

#### 35-FOOT SAFETY TETHER

The 35-foot safety tether connects the crewmember to a slide wire along the cargo bay sill longeron during EVA. The tether consists of a reel case with an integral D-ring, a take-up reel, a 35-foot cable, and a locking hook as shown in Figure 8. A selector on the reel case can be set to lock the take-up reel or to unlock it to allow the tether to reel out and retract. The locking hook on the tether incorporates a lock-lock feature to prevent accidental opening.

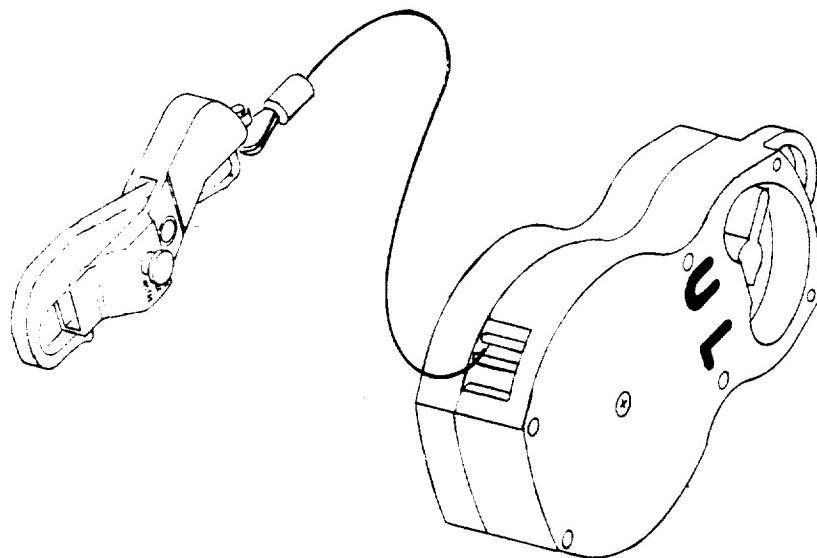


Figure 8: 35-Foot Safety Tether

For launch and entry, the port and starboard safety tethers are stowed in a cloth-covered stowage container which is secured to the bulkhead above the airlock in the cargo bay. While still in the airlock, after opening the airlock hatch, a crewmember attaches a waist tether to the D-ring of the 35-foot safety tether. The other end of the waist tether is hooked to a ring on the EMU waist bearing.

A series of straps, clips, and a small capstan secures the 35-foot tether between the slidewire and airlock during launch and entry. The tether is secured near handrails to allow the crewmember to unstow it while moving to the work area and to restow it while returning to the airlock after finishing the extravehicular task.

#### WAIST TETHER

The waist tether consists of a strip of Nomex webbing material with an aluminum EVA hook on each end (one hook is larger than the other). See Figure 9. The fully extended tether is approximately 44 inches long including the hooks. The tether incorporates a load-limiting feature which allows no more than 75 pounds to be imparted to the EMU until full extension of the tether occurs. If this load is exceeded, the tether will break and the shock will be absorbed by the additional segment of webbing which allows the tether to accept loads of up to 585 pounds.

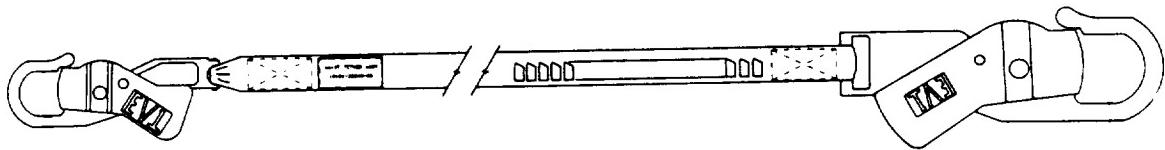


Figure 9: Waist Tether

Waist tethers are used to attach the crewmember to a worksite or to tether an otherwise unrestrained tool to the crewmember. The large hook is attached to handrails, and the small hook is attached to an EMU waist tether ring. Opening of an EVA hook requires that push-to-open buttons on each side of the hook be depressed simultaneously while the hook is squeezed. The hook will spring closed as soon as it is released. The small hook opens 3/4-inch and the large hook opens 1-inch. Two waist tethers are normally attached to each EMU.

### 3.1.3 EVA TOOLS

#### TUBE CUTTER

The tube cutter consists of spring-loaded retention rollers, a cutting wheel mounted on a slide, a small ratchet handle that moves the slide, and a large ratchet handle which turns the cutting mechanism around the tube being cut as shown in Figure 10. The tube cutter is designed to cut the Inconel 718 drive tubes which open and close the payload bay doors. The tool is preset to cut tubes with 1/2 to 3/4-inch diameters but can be readjusted to cut 3/4 to 1-inch diameter tubes by flipping the slide 180 degrees and moving the cutter blade to the second screw hole.

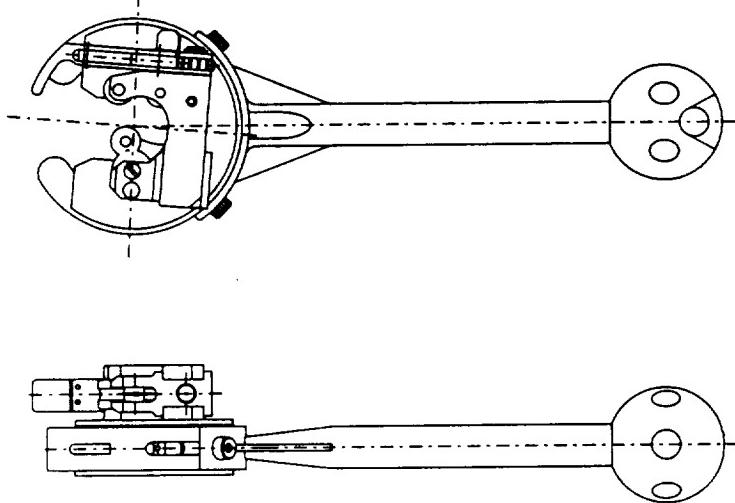


Figure 10: Tube Cutter

During use the tool is pushed on the tube to be cut and is held in place by the retention rollers. The cutting wheel (mounted on a slide) is ratcheted down with the small ratchet handle until it contacts the tube. The large ratchet handle is then used to rotate the entire tube cutter around the tube. The cutting wheel is then tightened, as required, to provide the cutting action. Only a minimal force is required by the operator to cut the drive tube.

#### CENTERLINE LATCH BYPASS TOOL

The centerline latch bypass tool consists of spring-loaded and fixed-load pickup points, a reversible ratchet with stowable handle, and release triggers which have a safety to prevent accidental release. See Figure 11.

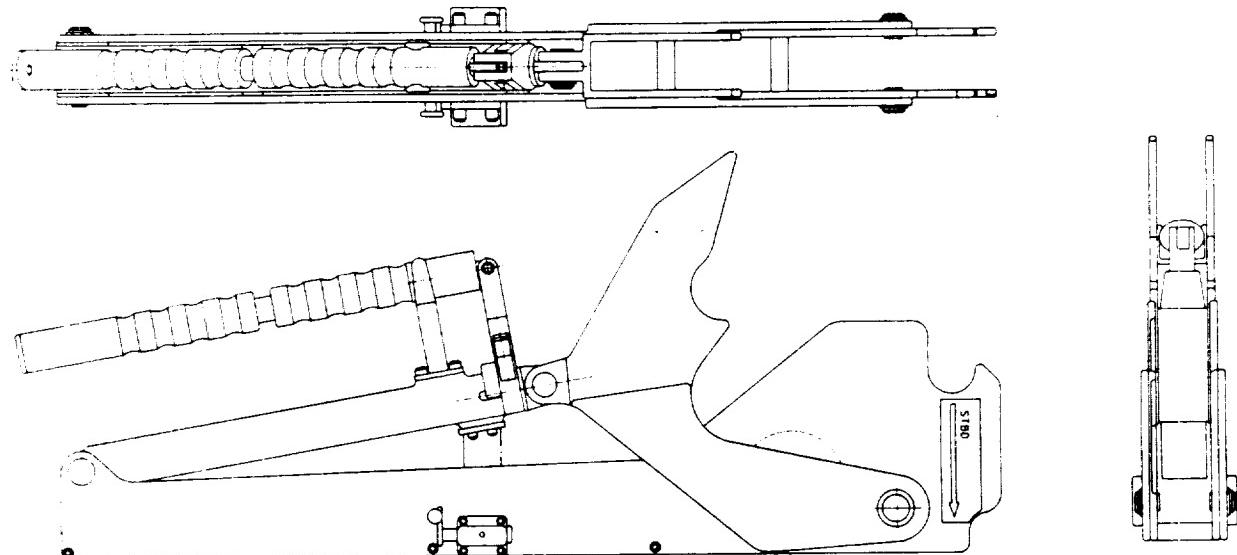


Figure 11: Centerline Latch Bypass Tool

The centerline latch tool is used to bypass a failed cargo bay door centerline latch. The tool is designed to exactly duplicate the nominal latch loads on the latch hook and roller. The frame of the tool fits over the latch hook pivot. With the frame held firmly in place, the tool latch is released, which in turn captures the latch roller. The tool handle is rotated to an upright position, and the drive is ratcheted to a hard stop, loading the tool and securing the latch.

#### THREE-POINT LATCH TOOL

The three-point latch tool consists of one spring-loaded and two fixed-load pickup points, a reversible ratchet with stowable handle, two installation handles, and a latch, Figure 12. The tool duplicates the loading on a latch roller produced by a latch hook in nominal condition, transferring loads to the hook pivot, the locking bellcrank, and the latch roller, which secures the forward and aft payload bulkhead latches.

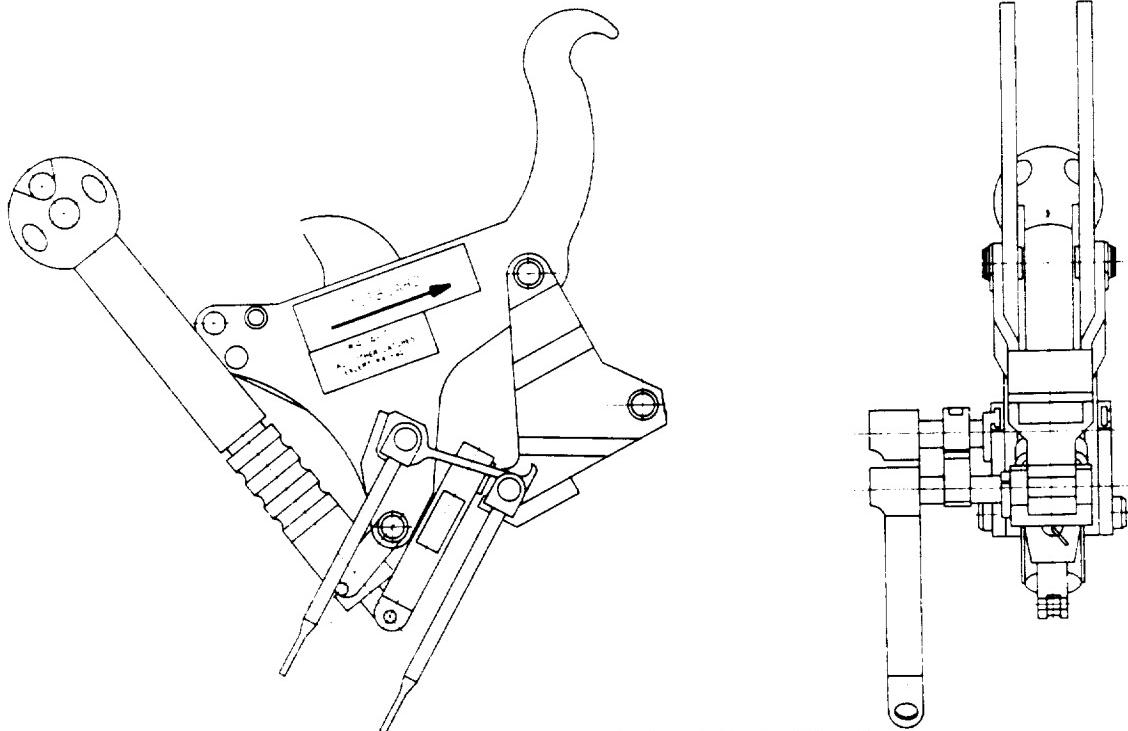


Figure 12: Three Point Latch Tool

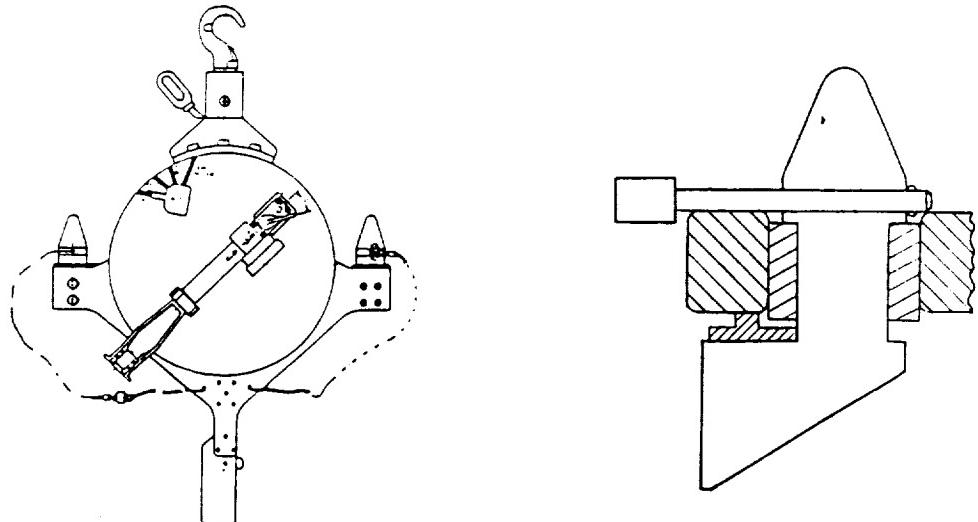
The three-point latch tool is a Shuttle-unique device designed to substitute for the payload bay door forward and aft bulkhead latches if a failure occurs in one of these latches. The tool cannot be installed on a bulkhead latch that has failed with the hook open less than 37 degrees due to interference with the latch hook. Detachable installation handles allow installation of the tool on either side of the bulkhead.

#### EVA WINCH AND MOUNTING ASSEMBLY

The EVA winch consists of a Kevlar rope, a rope housing, a reel, a stowable ratchet handle, and a mounting adapter. A rope guide with rollers to prevent fraying is mounted on the housing. The ratchet lever is used to select reverse, neutral, and engage positions, while the control handle selects ratchet in, ratchet out, reel out, or gear release positions. The winch has 24 feet of 3/8-inch diameter Kevlar rope with a hook attached to the end.

The winch is used to close the payload bay doors manually in the event the door drive system fails. One winch is mounted on each of the forward and aft cargo bay bulkheads. After all apparent obstructions to door movement have been removed and any necessary disconnect and/or cutting operations have been completed, the crewmember routes the rope over the number 4 hook roller and attaches the rope hook to the number 4 latch bellcrank at the top of the door. A load of 600 pounds can be applied on the rope by placing the control to "ratchet in", engaging, and cranking the ratchet handle.

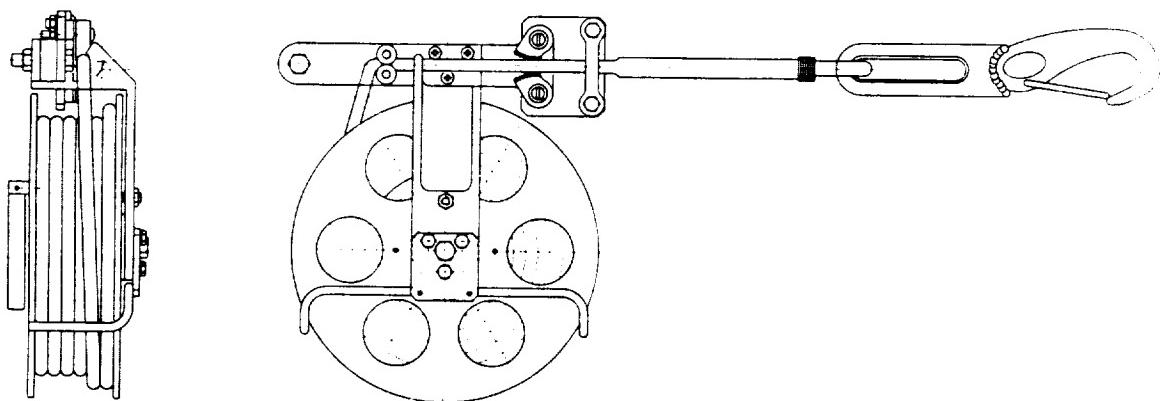
The EVA winch and mounting assembly are shown in Figure 13.



**Figure 13: EVA Winch and Mounting Assembly**

#### **RMS EVA WINCH ADAPTER ASSEMBLY**

The remote manipulator system (RMS) EVA winch adapter assembly is comprised of a rope spool with handle, spool bracket, rope guide and rollers, and cam cleats as shown in Figure 14. The RMS winch adapter assembly holds 65 feet of 3/8-inch diameter rope. The rope has a 7 3/4-inch hook on the end, with a spring clip for secure attachment.



**Figure 14: RMS EVA Winch Adapter**

The RMS EVA winch adapter assembly is used in conjunction with the snatch blocks in the event of RMS joint failure. The rope is routed through the snatch blocks and attached to the handrail on the tip of the RMS. The crewmember then backdrives the RMS into

the stowed position using the RMS EVA winch adapter assembly. The spool bracket and the rope spool both have handles. Two cam cleats on the rope reel clamp down on the rope to prevent it from being pulled off the reel.

#### PAYLOAD RETENTION DEVICE

The Payload Retention Device (PRD) is used as a contingency tiedown for payloads that cannot be properly restowed in their launch positions for reentry. It consists of a Kevlar webbing strap with French hooks on the ends and a stainless steel and aluminum ratchet mechanism for tightening as shown in Figure 15.

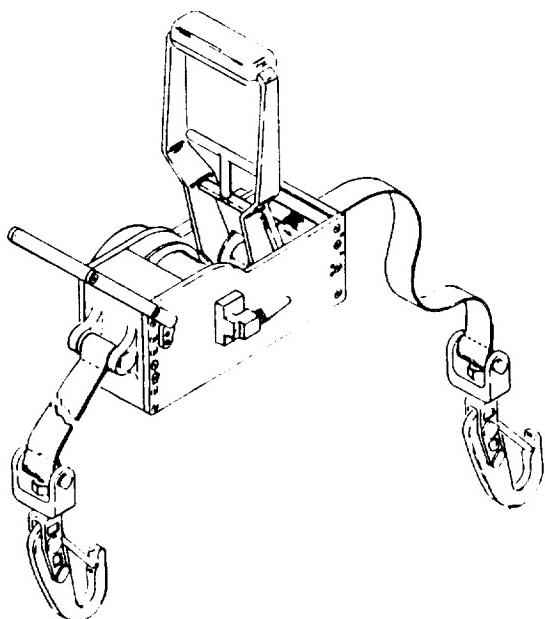


Figure 15: Payload Retention Device

The PRD can be attached with French hooks to tether points in the cargo bay, on the equipment to be secured, or to another PRD. After both ends of the PRD are hooked in place, the crewmember pulls the handle to operate the ratchet, tightening the strap until the payload is secure. The ratchet mechanism reels in the strap at a sufficiently slow rate that the article being secured repositions itself, thereby preventing inadvertent damage. The PRD does not allow a controlled release of tension; it is intended only as a tiedown device.

As of this writing, the PRD has not been certified for tie-down of payloads during re-entry. The device has been certified only to load levels which permit RMS retention.

### EVA CABLE CUTTER

The cable cutter is a standard cutter modified for EVA use. It is equipped with large handles to fit the EVA glove. The tool handles are covered with Velcro and a tether point is provided. When fully open, the cutter jaw opening measures 5/16-inch wide and 5/16-inch deep. See Figure 16.

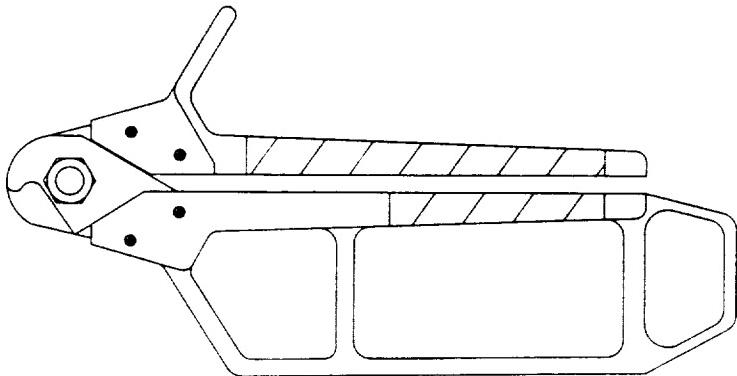


Figure 16: EVA Cable Cutter

The cable cutter is initially operated with two hands in order to close the cutting jaws and capture the cable. After capture, the handles may then be operated with one hand to cut the cable.

### SNATCH BLOCK ASSEMBLY

The snatch block is a common marine device modified for EVA use. It is used with a 3/8-inch diameter rope. The snatch block hook has a snap lock to provide a more secure attachment. The hook has an opening of 3/4-inch and is attached by a swivel shaft allowing 360 degrees rotation. See Figure 17.

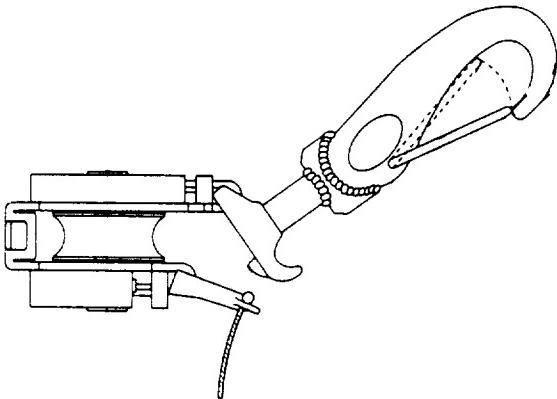


Figure 17: Snatch Block Assembly

The snatch block is used to route the cargo bay winch line to support payload tasks. In the event of an RMS failure, it can be used with the RMS EVA winch adapter assembly to backdrive the RMS to a stowed position. Additionally, if a failure should occur in the Airborne Support Equipment (ASE) drive system, the snatch block can be used to stow and/or deploy the Inertial Upper Stage (IUS).

### 3.1.4 IVA TOOLS

#### TURNBUCKLE

The turnbuckle consists of three adjustable length links joined by pin and hole connections as shown in Figure 18. After being placed in position between the mid-deck lockers the crewman can manually adjust the threaded lengthening knobs to provide a snug fit.

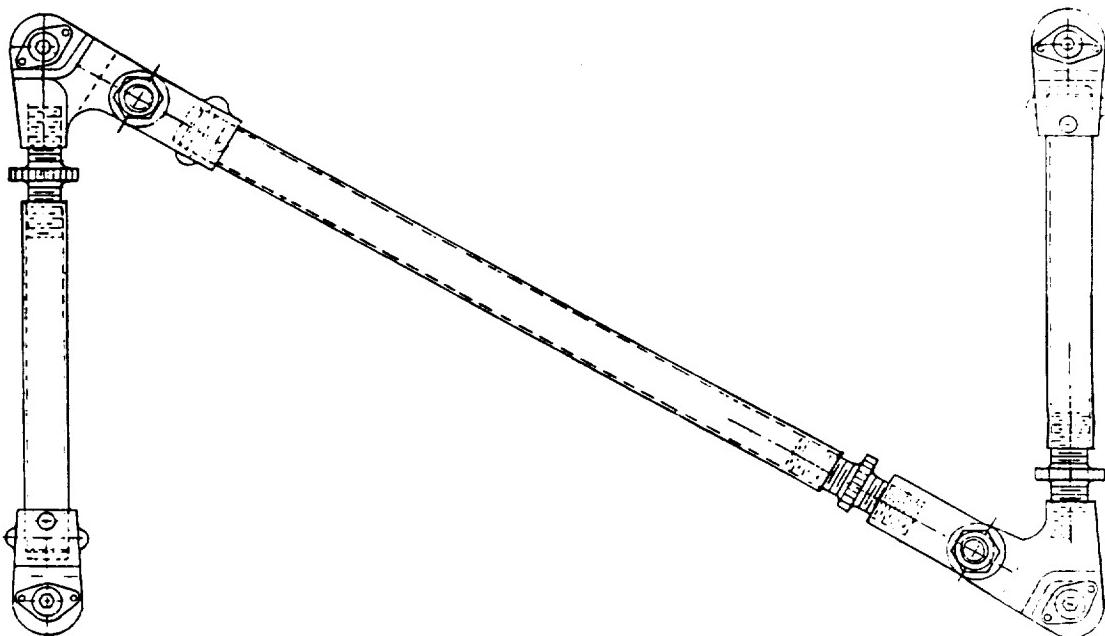


Figure 18: Turnbuckle

The turnbuckle is designed to maintain the positions of the mid-deck stowage lockers after (a maximum of) three lockers have been removed. Mid-deck lockers are normally removed to gain access to the forward avionics bay for a variety of in-flight maintenance tasks, including GPC changeout.

### LOCKER REMOVAL TOOL

The locker removal tool is a combination ratchet/torque wrench with an extension terminating in a hex drive head as shown in Figure 19. Two locker tools are flown as a part of the IVA tool kit. The extension portion of the tool is designed to fit through the installation/removal tool guides at the four corners of the middeck lockers so that the hex head drive can make contact with the four structural attach fasteners at the rear of the lockers. The ratchet portion of the tool is then used to either loosen or tighten these fasteners so that the locker can either be removed or reinstalled.

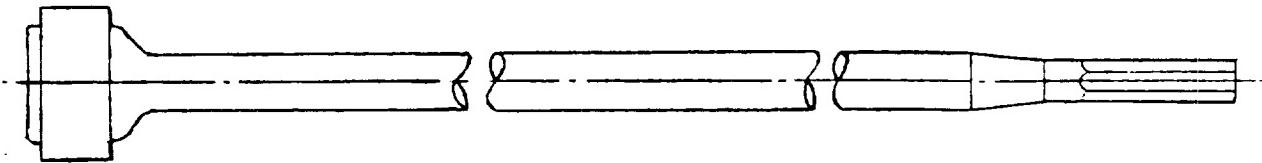


Figure 19: Locker Removal Tool

### IFM BREAKOUT BOX

The IFM breakout box is designed to provide 1.5 - 28 V dc variable power to support any contingency procedure which may occur during on orbit operations and require electrical power. A standard orbiter power cord connects the breakout box with one of the shuttle utility power panels to provide the 28 V dc input. See Figure 20.

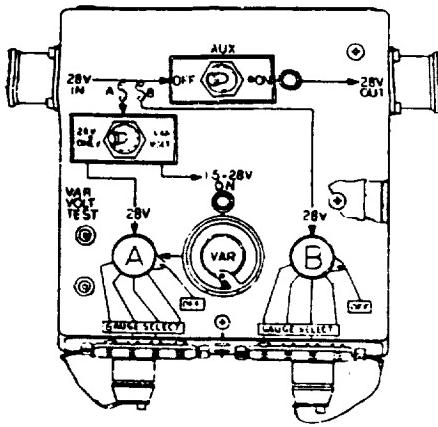


Figure 20: IFM Breakout Box

There are three power output connections on the IFM breakout box. One is an outlet for another standard power cord at 28 V dc and is used when two IFM breakout boxes are required to complete a contingency procedure.

The "B" outlet is also 28 V dc but allows the choice and connection of one of four wire gauges (12, 16, 20, or 22). The choice of wire gauge will be dictated by the requirements of the particular piece of equipment under repair. The wires used to connect the IFM breakout box to the equipment being powered are found in the IFM pin kit. In addition to the pre-made pin/wire combinations, the kit provides the capability for the crew to manufacture any other required options on orbit.

The "A" outlet provides the choice of wire gauges plus the selection of either 28 V dc or a variable voltage between 1.5 and 28 V dc. This selection is made by means of a selection switch. If the variable voltage is required, a multimeter (also carried on board) is connected to the test ports of the IFM breakout box and the potentiometer (built into the IFM breakout box) is used to set the desired voltage level. Note: All power outlets of the breakout box may be used simultaneously.

There are a number of safety options built into the IFM breakout box. In addition to the selection switch position, the active options on the breakout box are displayed by means of LEDs directly above the operational options. Built-in fuses protect the circuit from over-current conditions. Temperature sensing/display strips are mounted on all sides of the breakout box for crew safety purposes.

### **3.1.5 FOOD ASSEMBLIES**

#### GALLEY ASSEMBLY

The galley is used by crewmembers during meal preparation. The galley consists of an inlet water supply system, a water dispensing mechanism, a water heater, and an oven. Space on the galley is also allocated for storage and dispensing of items such as trays, silverware, condiments, and vitamins.

The water system consists of an inlet side which feeds water directly into the water heater and into the water dispensing system. The water heater has a twelve pound capacity and is located under the galley. Six heaters provide the heat to control the water temperature between 165 and 185 degrees F. Whenever hot water is dispensed, or the water drops below a given temperature, a recirculation pump will start to run so that the water will be heated in an efficient manner.

The galley has an electronic water dispensing system which allows the crewmember to select the amount of water to be fed through the needle. This amount can vary from 0.5 to 8.0 ounces in 0.5 ounce increments. In case of a failure of the electronic system, the galley is equipped with a water bypass system.

The galley oven consists of a set of heaters and three circulating fans to control the temperature and heat the food. The bottom of the oven depends upon this method of convective heating, while the top portion of the oven places the food packets into direct contact with the heaters and relies upon conductive heating.

The galley is shown in Figure 21.

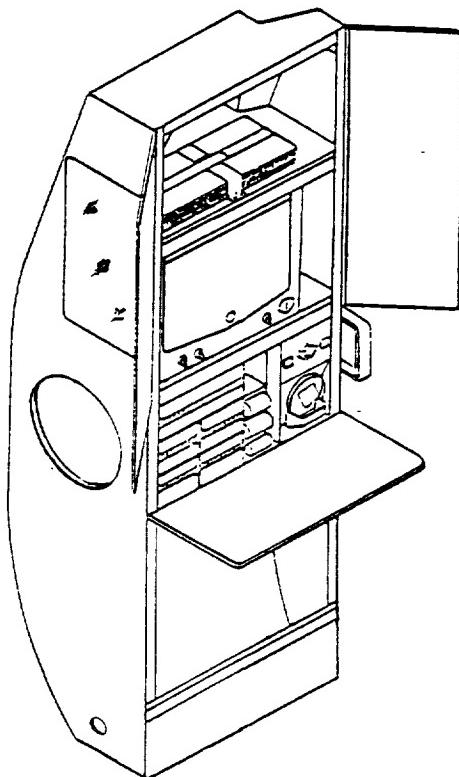


Figure 21: Galley

#### OPERATIONAL WATER DISPENSER

The Operational Water Dispenser Assembly (OWDA) is a compact system that provides the crew with ambient and chilled water sources for food rehydration, drinking, and hygiene purposes by interfacing with the Orbiter ambient and chilled potable water systems whenever the galley is not flown.

The major component of interest in the OWDA is the rehydration unit which is an electronic system for dispensing 2, 3, 4, and 8 ounces of water into the operational food and beverage containers requiring hydration. The water is introduced via a replaceable needle with two spare needles being flown.

ORIGINAL PAGE  
BLACK AND WHITE PHOTOGRAPH

Water dispensing is performed by a pressure regulator/solenoid valve arrangement. Inlet water with a nominal system pressure range of 12.0 to 22.0 psi is reduced to a constant pressure of 12.0 psi by the regulator. Downstream of the solenoid valve, an electronic controller governs the time of flow. This timed shut-off after constant flow translates to specific water quantities for accurate rehydration.

Additional components of interest include: (1) the power switch (the OWDA requires 28 V dc power); (2) the quantity select rotary switch and fill initiation switch combination; (3) a bypass fill valve to be used in case of a failure in (2); (4) various water lines; (5) a microbial check valve to prevent back contamination; and (6) a water selection switch for selecting either ambient or chilled water.

Additionally, the OWDA provides personal hygiene water. The water dispenser provides ambient water through a quick disconnect (QD) on its left side. The crewmember obtains water from this QD by attaching a 12-foot flex hose with a mating QD. On the opposite end of the flex hose is a valve and nozzle.

The OWDA is shown in Figure 22.

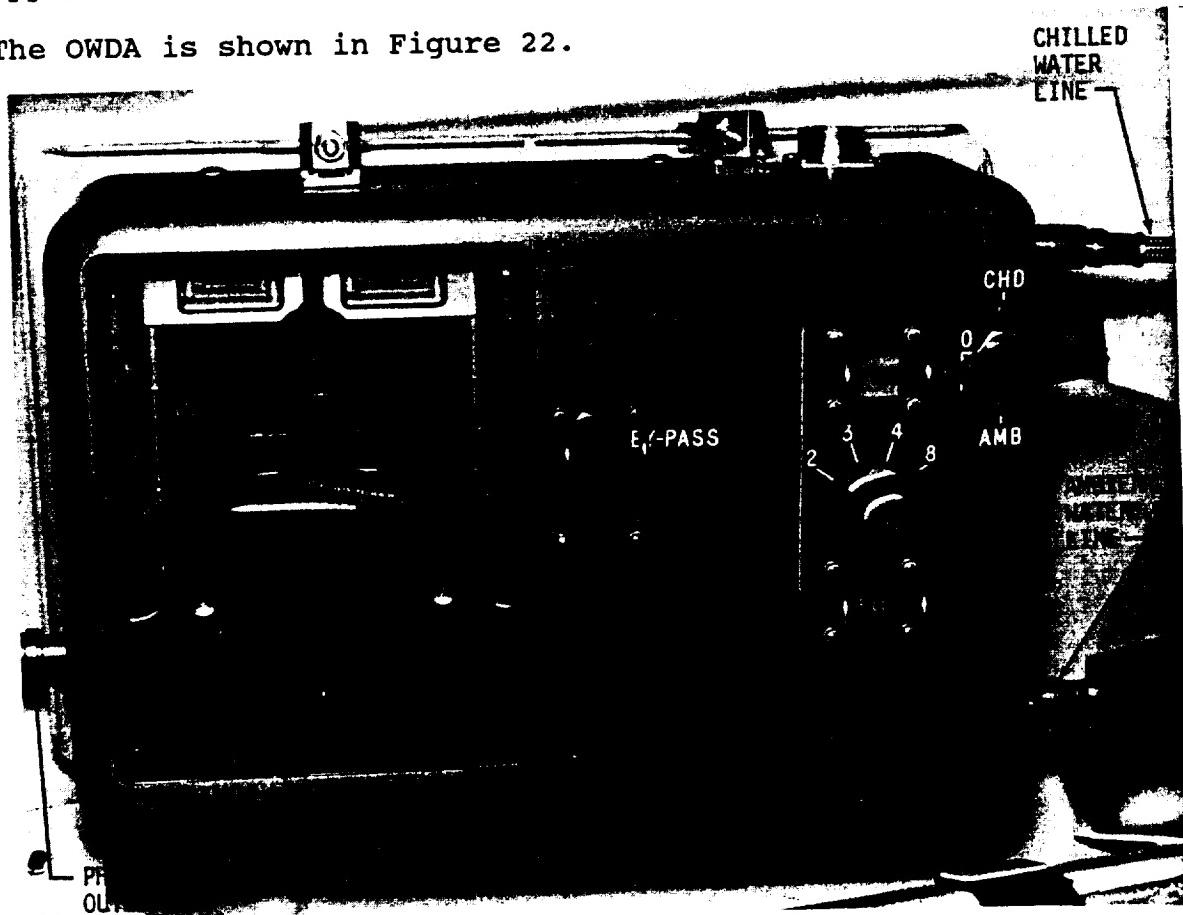


Figure 22: Operational Water Dispenser Assembly

## CONTINGENCY WATER DISPENSER

The contingency water dispenser is an extremely simple valve/needle combination which connects directly into the orbiter potable water supply and is used in the event of an OWDA or galley failure. See Figure 23.

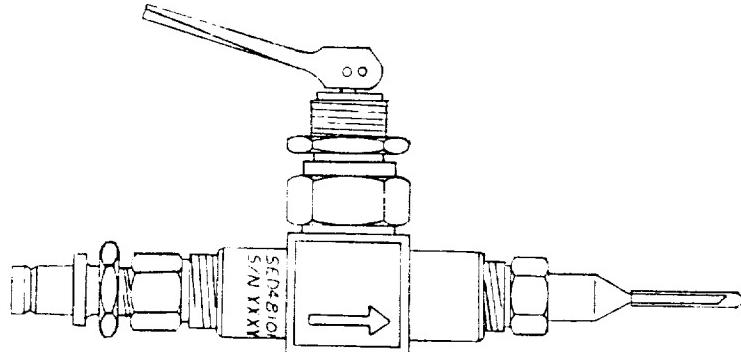


Figure 23: Contingency Water Dispenser Assembly

### **3.1.6 ORBITER HARDWARE**

#### PASSENGER SEATS AND RESTRAINTS

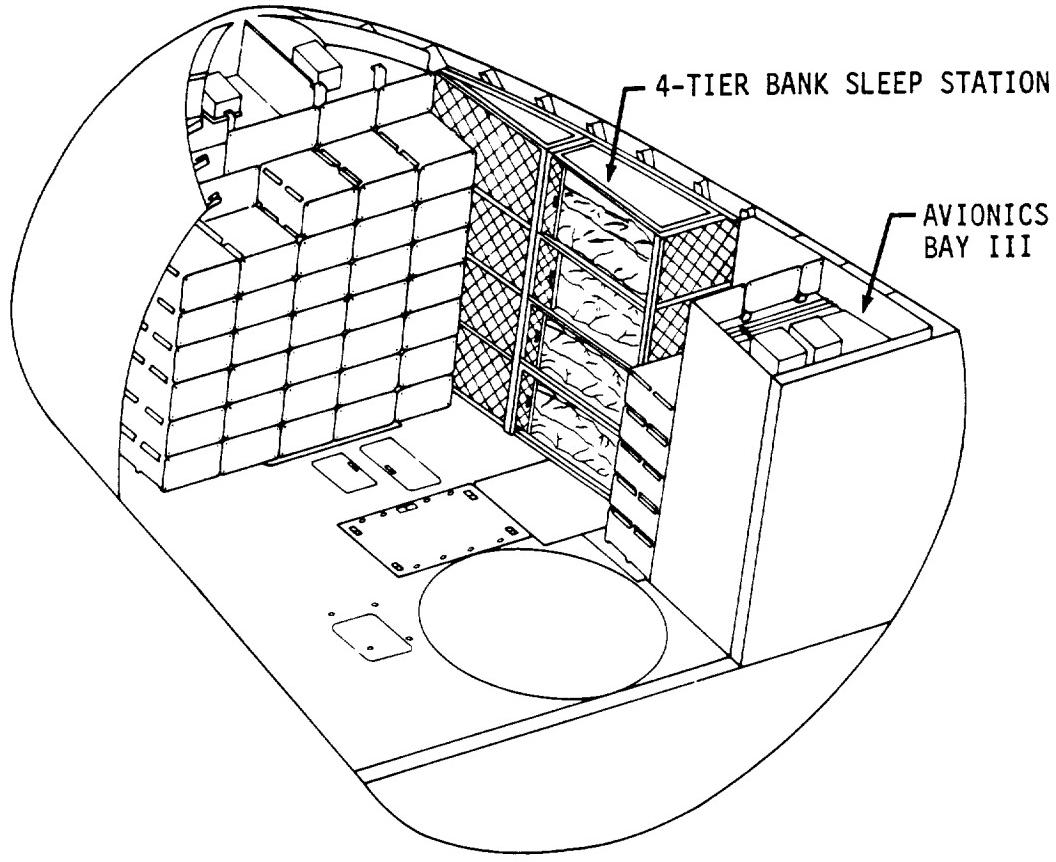
The passenger seats and restraints are under redesign due to the requirement for a crew escape system. The final approved design configuration is anticipated mid to late September. These items cannot be examined by the IOA contractor until this data has been received.

#### SLEEP STATIONS AND RESTRAINTS

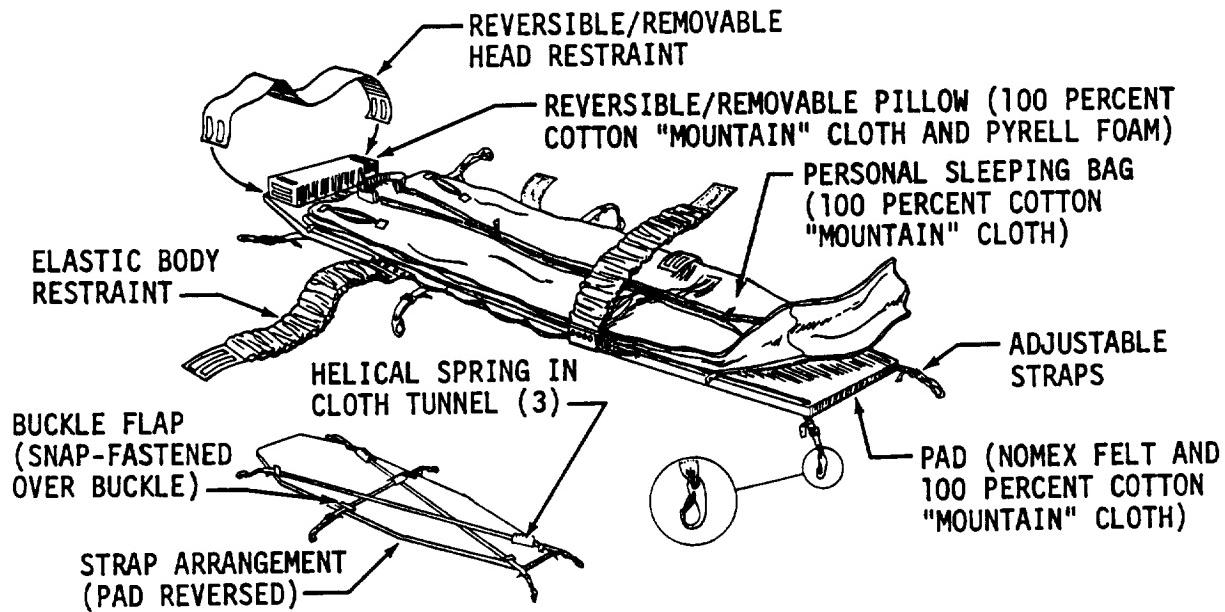
The four-tier bunk sleep station consists of four sleep stations in which the crewmembers enter sleep restraints that are similar to the sleeping bags, except that the restraints are fastened to rigid pallets. The sleep stations provide for light and sound attenuation and privacy by means of end/slide panels and sliding doors made of machined aluminum and Kevlar materials. The sliding doors allow ingress/egress into the sleep stations. The panels/door and support for the bottom station are removable for under-floor stowage access. To gain access to floor compartment Volume E, the crewmember needs to remove the bottom sleep station side panel and door. The door is physically attached to the side panel structure.

Lights are provided at the head of each sleep station. Ventilating air enters through a grille at the foot of each station into the Orbiter cabin. An adjustable air diffuser will permit a ventilation airflow of up to 20 cubic feet per minute.

The sleep stations and restraints are shown in Figure 24.



ORBITER MIDDECK



OPERATIONAL SLEEPING BAG

Figure 24: Sleep Stations and Restraints

### SIDE HATCH SAFETY LOCK

The side hatch safety lock consists of two aluminum clamps held together with a steel cap and pip pin. The safety lock protects the side hatch lock lever from becoming inadvertently unlocked while the vehicle is on-orbit. The aluminum clamps are placed on each side of the crank handle. The steel cap is placed on the clamps such that the pip pin may be placed through the clamps and cap. The side hatch safety lock is removed by reversing the procedure. The safety lock is installed during the orbital phase of the mission and removed during deorbit procedures.

The side hatch safety lock is shown in Figure 25.

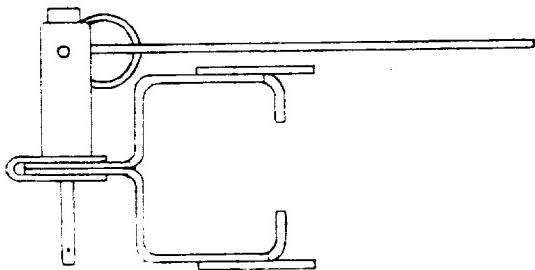


Figure 25: Side Hatch Safety Lock

### LOCKERS

Modular lockers provide the middeck stowage space. Each modular locker provides 2 cubic feet of stowage volume. The lockers are locked to the avionics bay by four attach fasteners and can be removed in flight by the use of an extension drive and ratchet assembly.

The lockers have hinged doors with two magnetic on-orbit latches and two captive wingnut locks for securing the doors during launch and entry/landing. The doors have a friction hinge for zero-g positioning. The door can be opened a full 180 degrees. When 90 degrees open, the door's inner surface is flush with the bottom of the lockers.

The lockers are configured with a standard hole pattern for attaching straps and brackets to restrain stowed equipment. Three standard sizes of reusable trays are available. To hold the stowed items, foam inserts are available. An avionics bay closeout panel is used for structural continuity when modular lockers are not flown. As many as 42 modular lockers can be flown.

A typical locker is shown in Figure 26.

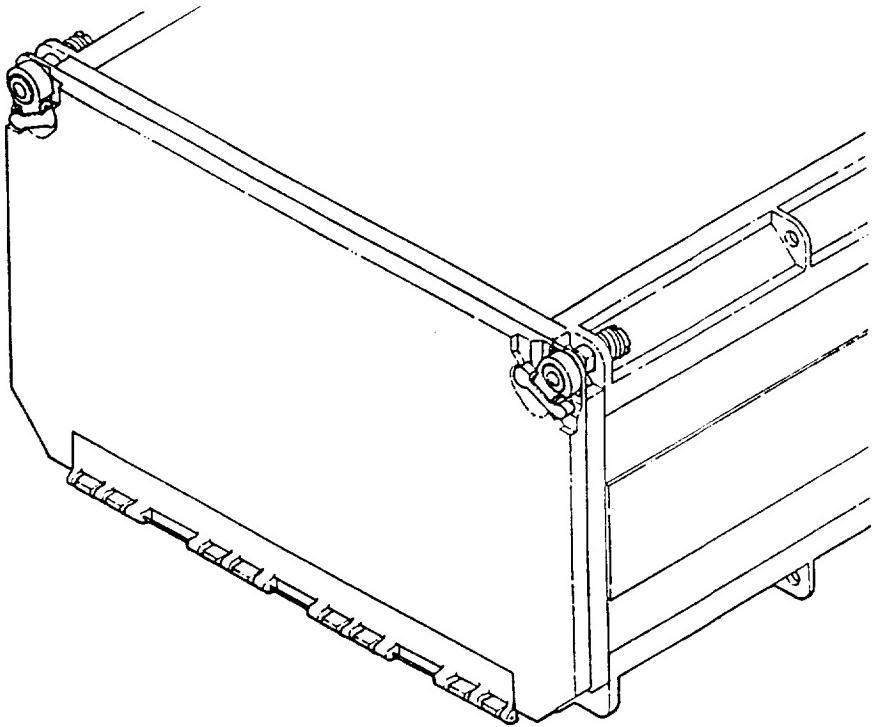


Figure 26: Lockers

#### TREADMILL

The treadmill consists of a conveyor running track contained in a metal housing. The treadmill base has quick disconnect attachment fittings that fit onto the mid-deck floor deck studs. The running track itself is coupled to a rapid onset braking system which is regulated by a speed control knob. When the preset speed is attained, the rapid onset braking system applies increased drag to the running track and consequently limits the speed of the runner.

To exercise in zero-g, a restraint system is used to apply near one-g forces to the body. Four force cords are routed near the four corners of the treadmill to restrain the body to the running track. The force cords are routed through a series of pulley wheels to provide a more constant force delivered to the body. The force cords attach to the slip buckles which are attached to the adjustment straps on a waistbelt.

The treadmill and the associated restraint cords are shown in Figure 27.

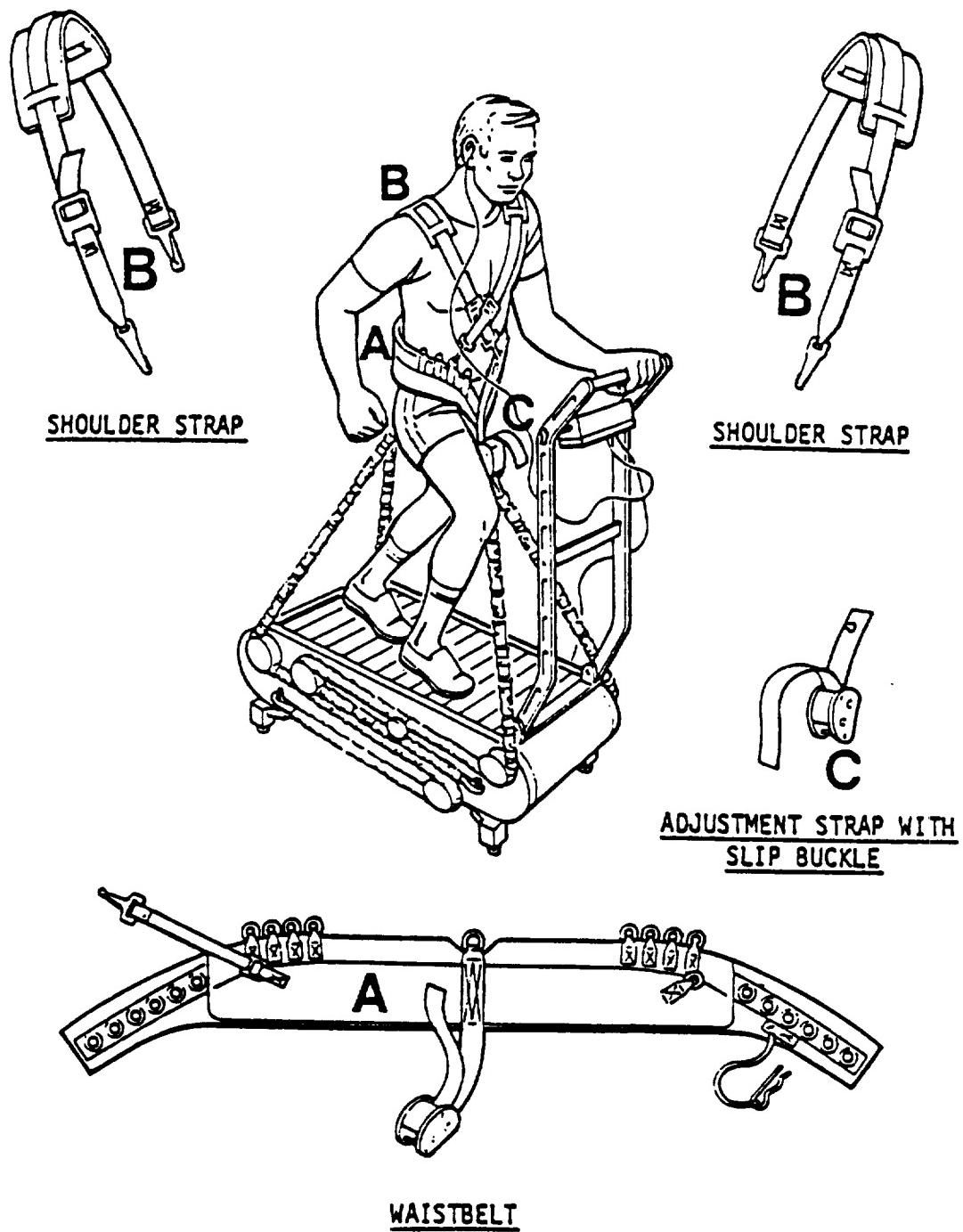


Figure 27: Treadmill

### COAS ASSEMBLY

The COAS is a collimator device similar to an aircraft gunsight. It consists of a lamp with an intensity control, reticle, barrel-shaped housing, mount, combiner assembly, and a power cable.

The COAS is designed for use in the right-hand overhead window and in the left-hand forward window. The overhead window position is the primary use location and the forward window position is the secondary location. The COAS is installed in the primary position and in the secondary position by using a mounting bracket which is locked in position by two COAS thumbscrews. In the forward position a forward mounting adapter is installed prior to COAS installation. This adapter is locked into position with a single thumbscrew. The COAS is utilized in the right-hand overhead window to provide range and range rate for rendezvous/docking, for IMU backup alignment, and Z-axis sighting. In the left-hand forward window the COAS is used for stationkeeping/tracking, miscellaneous Orbiter alignment tasks, and as a backup location for IMU alignment. The COAS provides the crewman a fixed line-of-sight attitude reference image that appears to be the same distance away as the target. This image is boresighted (by means of a sight mount) parallel to the X-axis (centerline of the Orbiter).

The COAS and the associated brackets are shown in Figure 28.

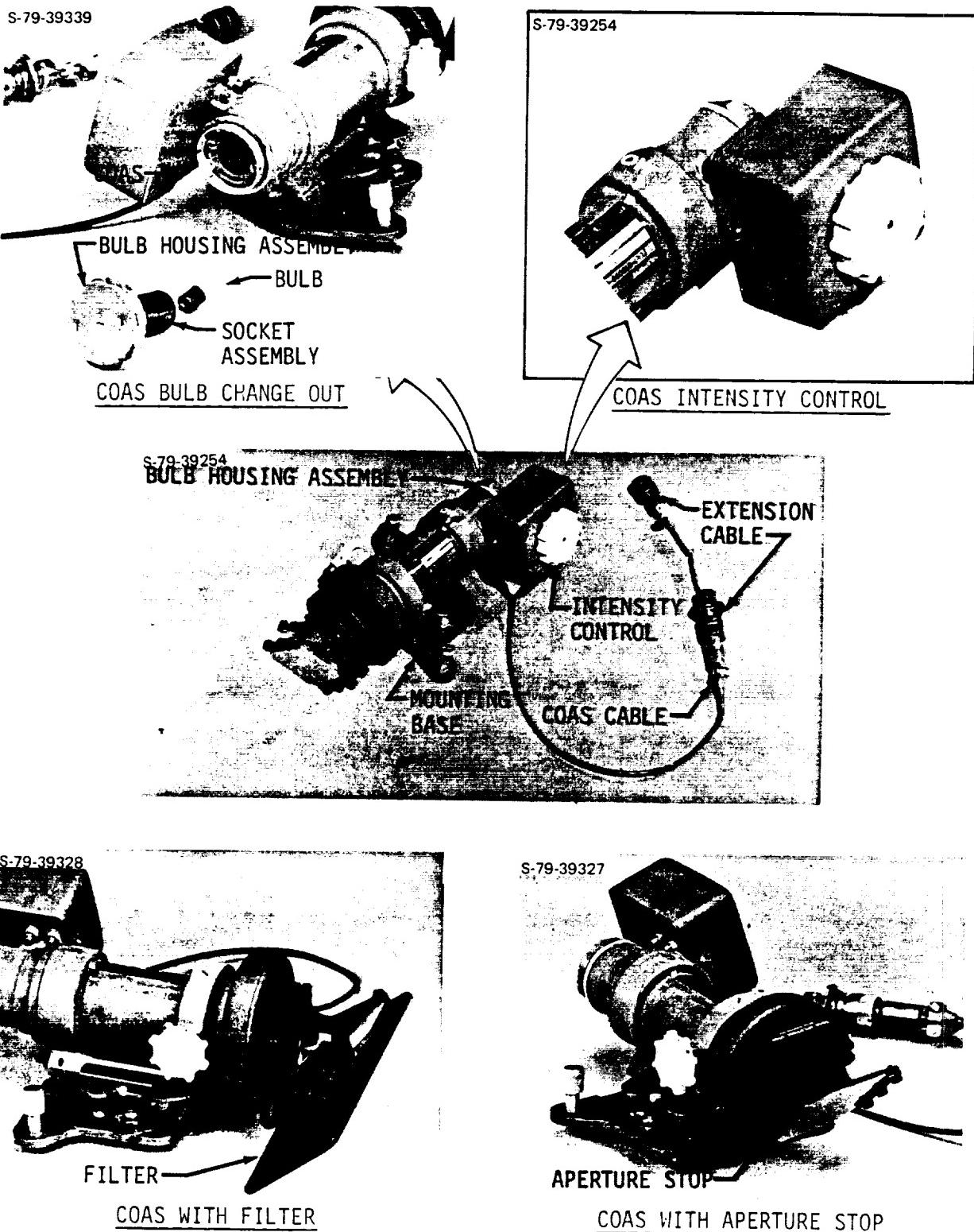


Figure 28: COAS

### **3.2 Locations And Interfaces**

The crew equipment items are located in both the crew compartment and the payload bay. Refer to the preceeding descriptions for details.

### **3.3 Hierarchy**

The overall hierarchy for crew equipment is shown in Figure 29. Detailed breakdowns are presented in Figures 30 through 39.

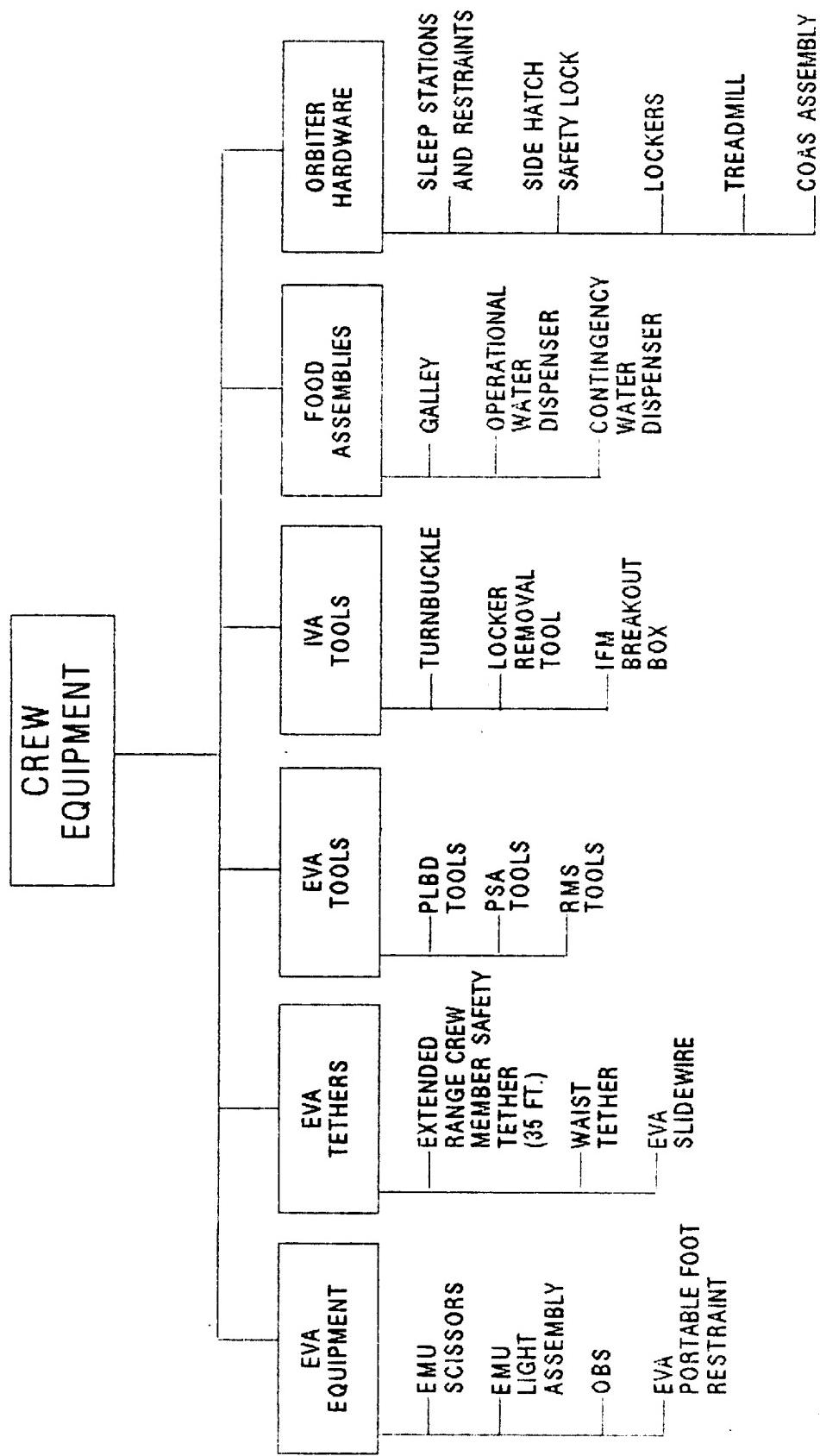


Figure 29: Crew Equipment Hierarchy

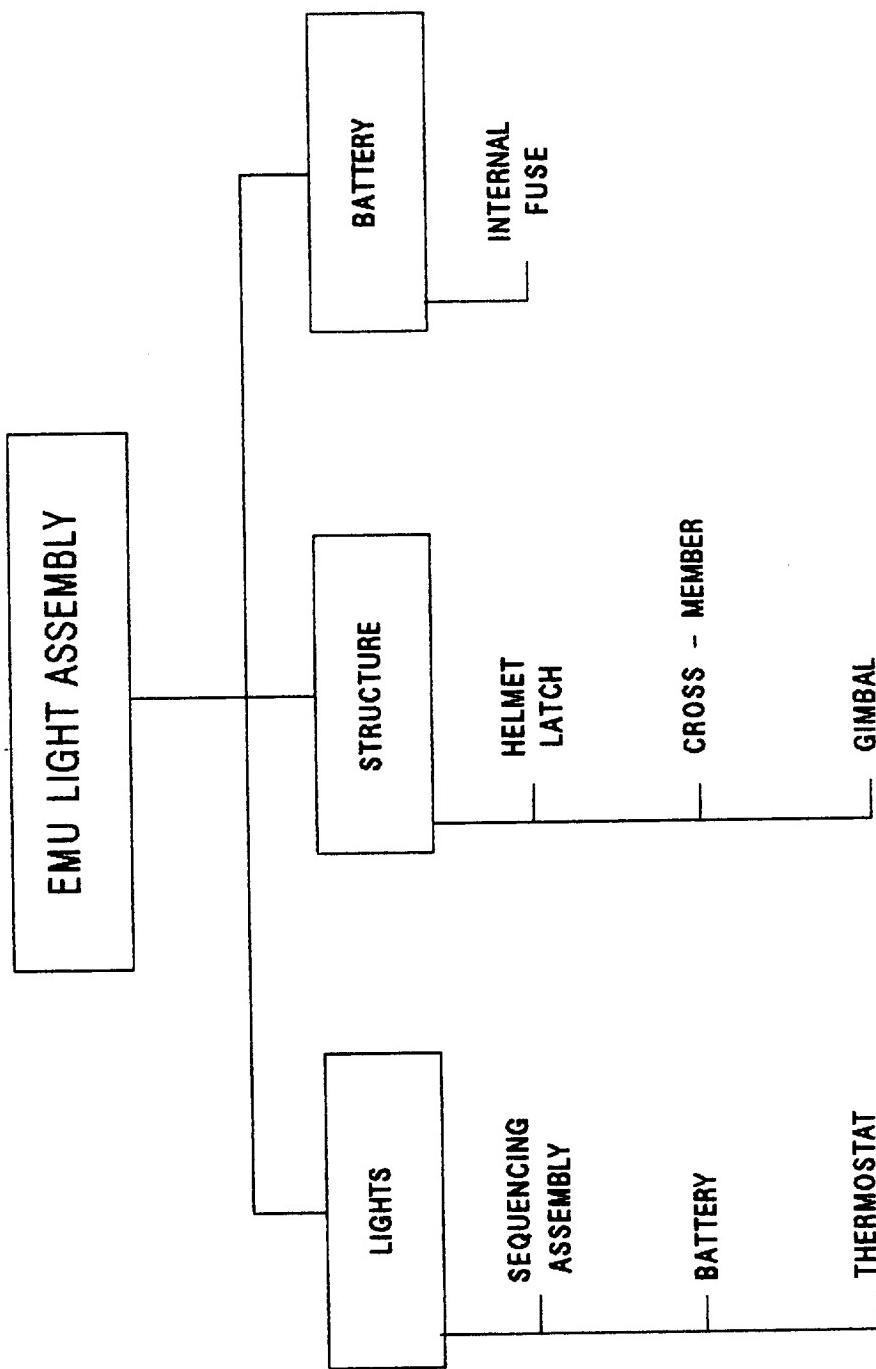


Figure 30: EMU Light Assembly Hierarchy  
33

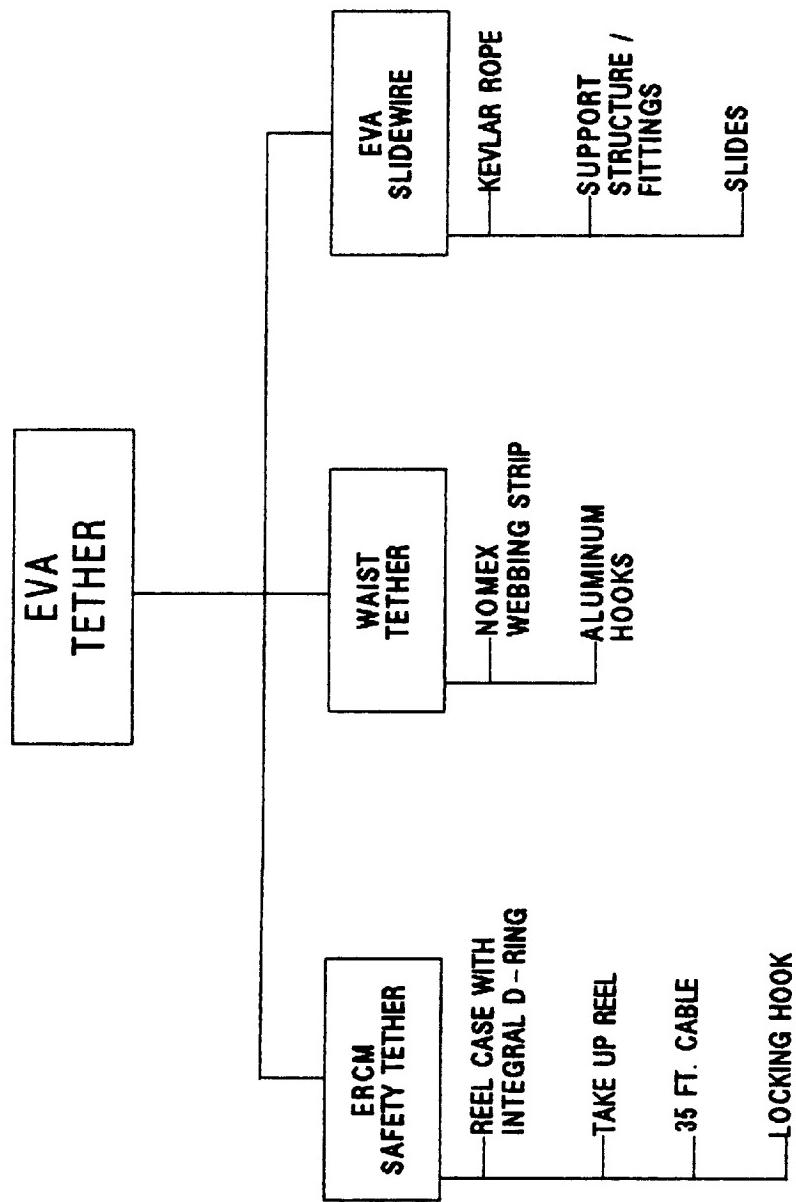


Figure 31: EVA Tether Hierarchy  
34

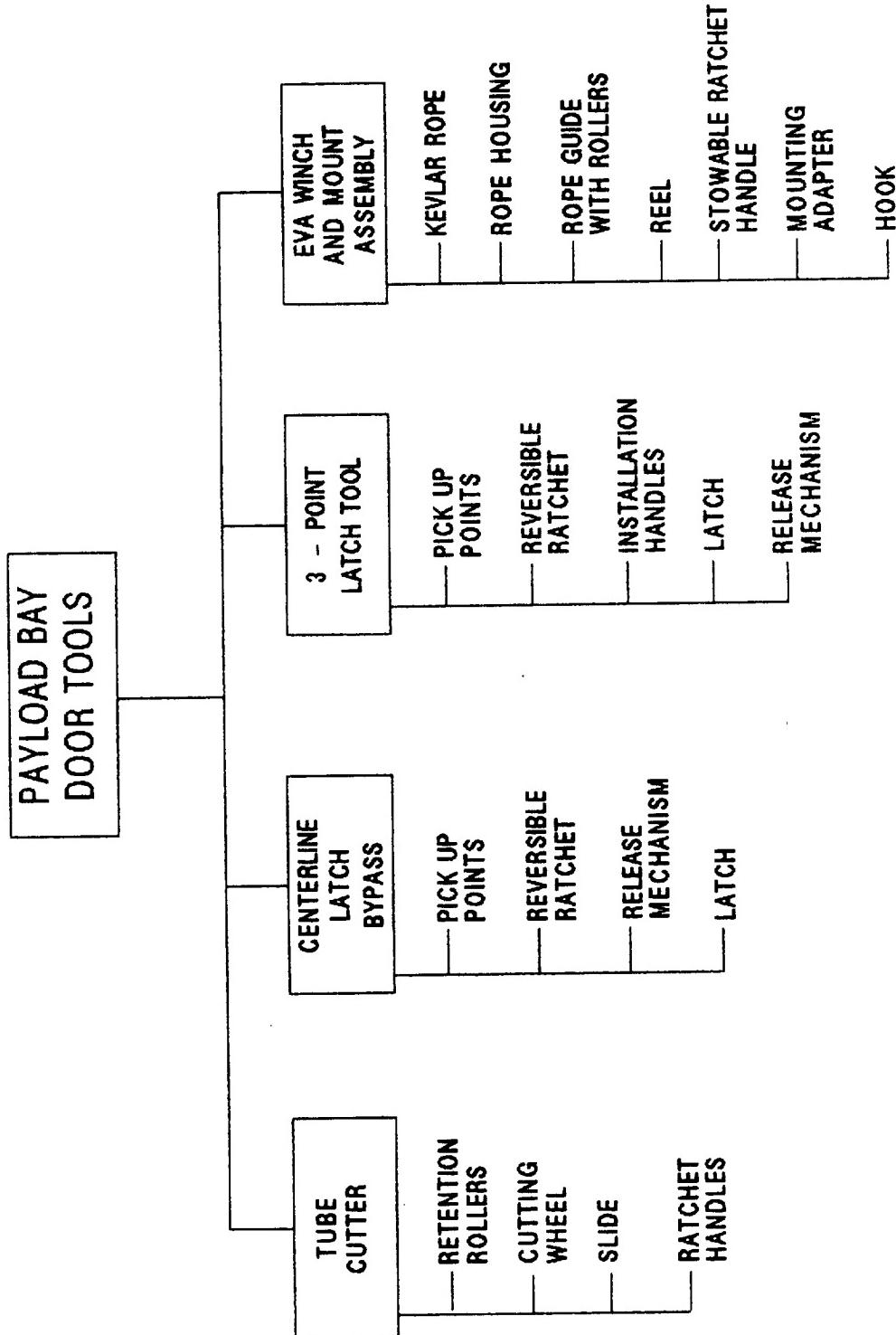


Figure 32: Payload Bay Door Tools Hierarchy

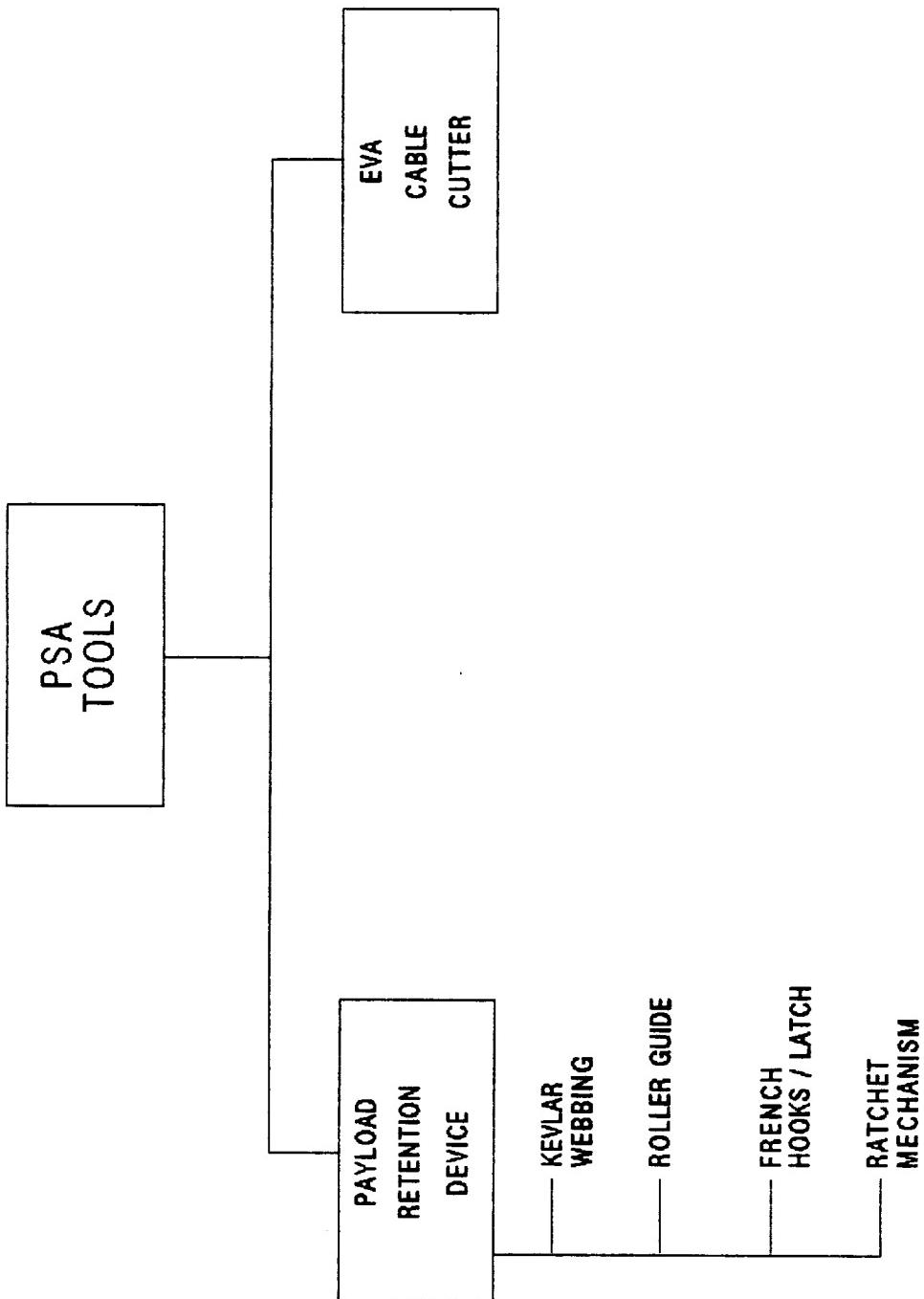


Figure 33: PSA Tool Hierarchy  
36

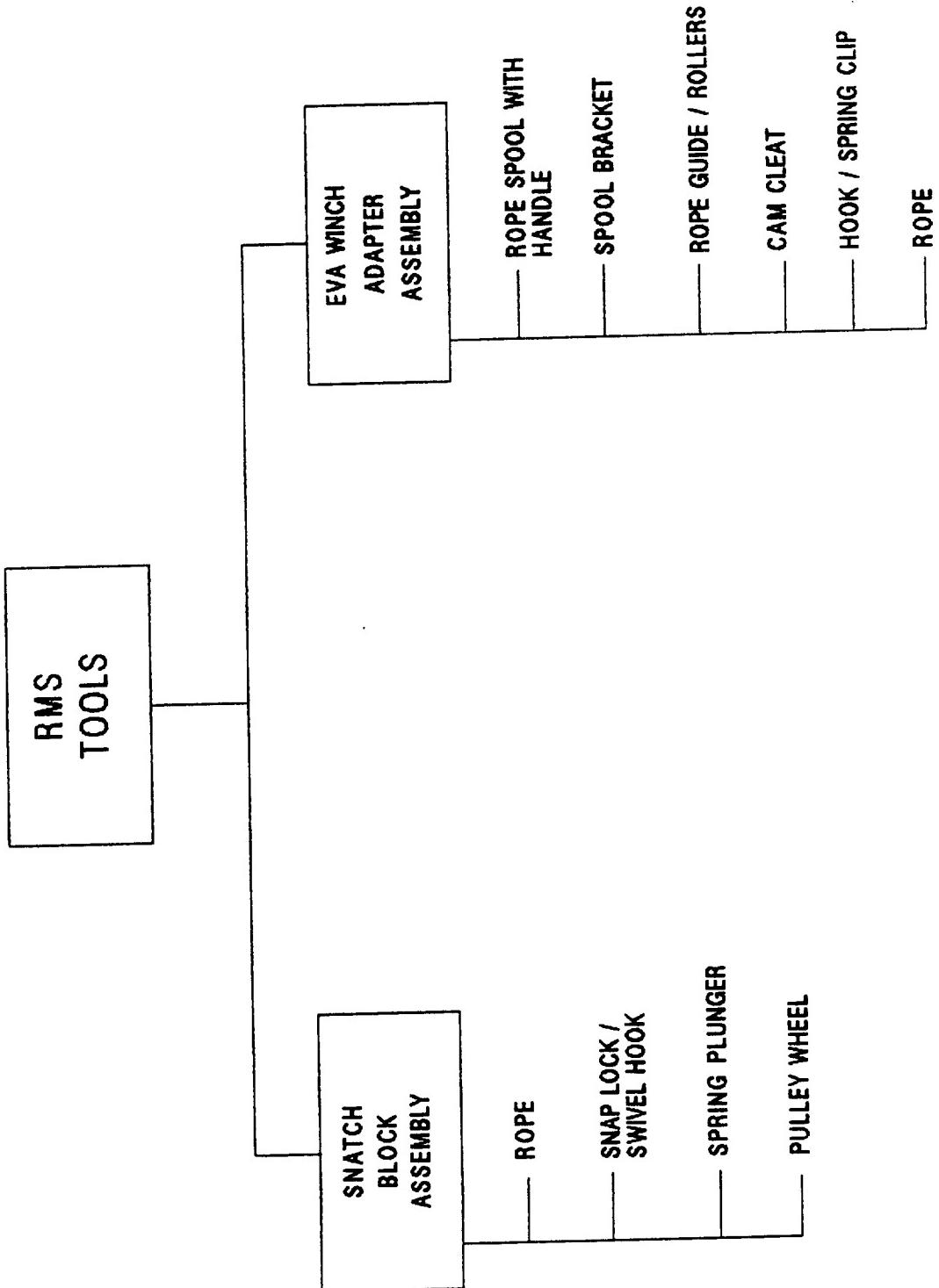


Figure 34: RMS Tool Hierarchy  
37

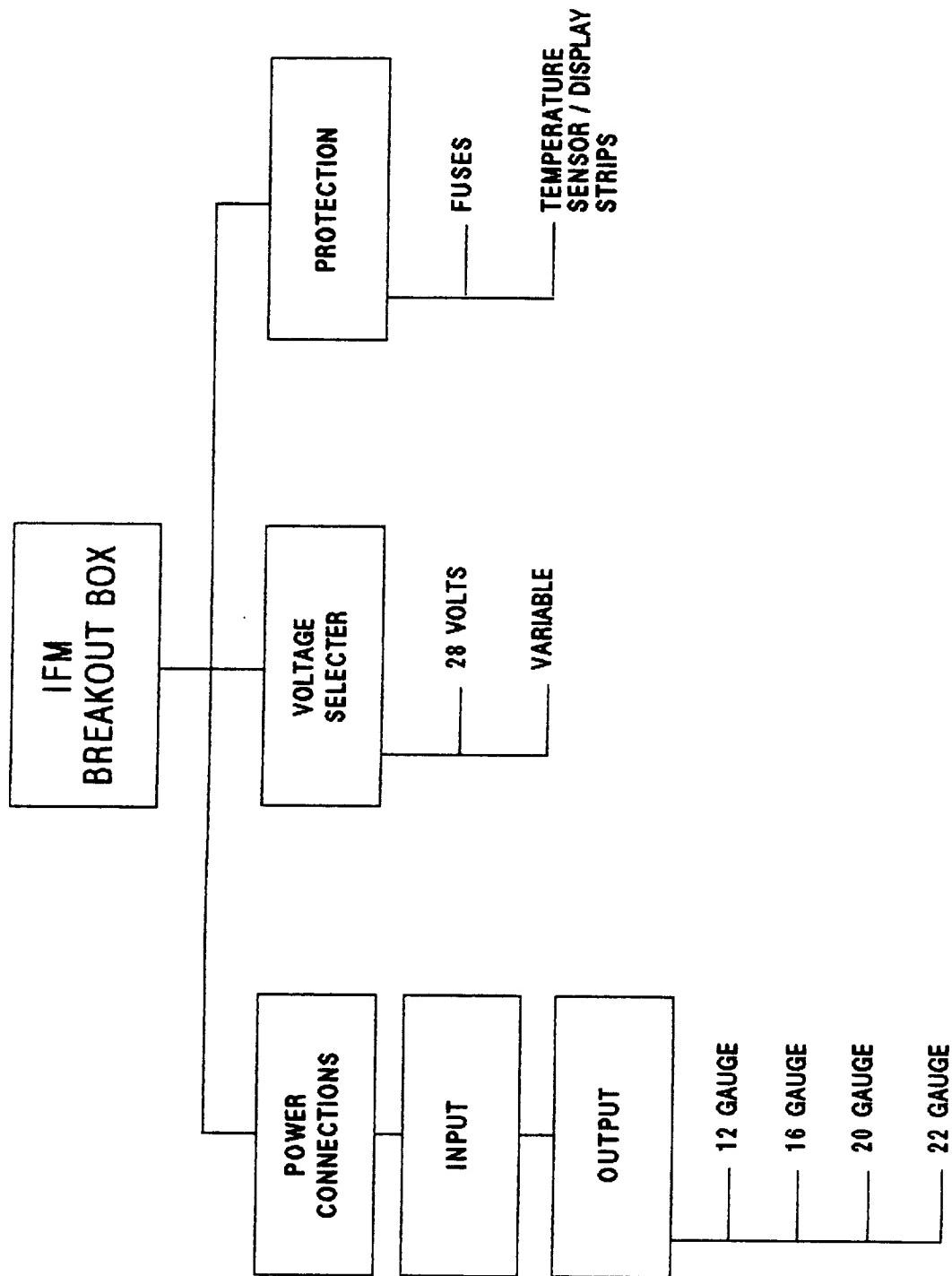


Figure 35: IFM Breakout Box Hierarchy  
38

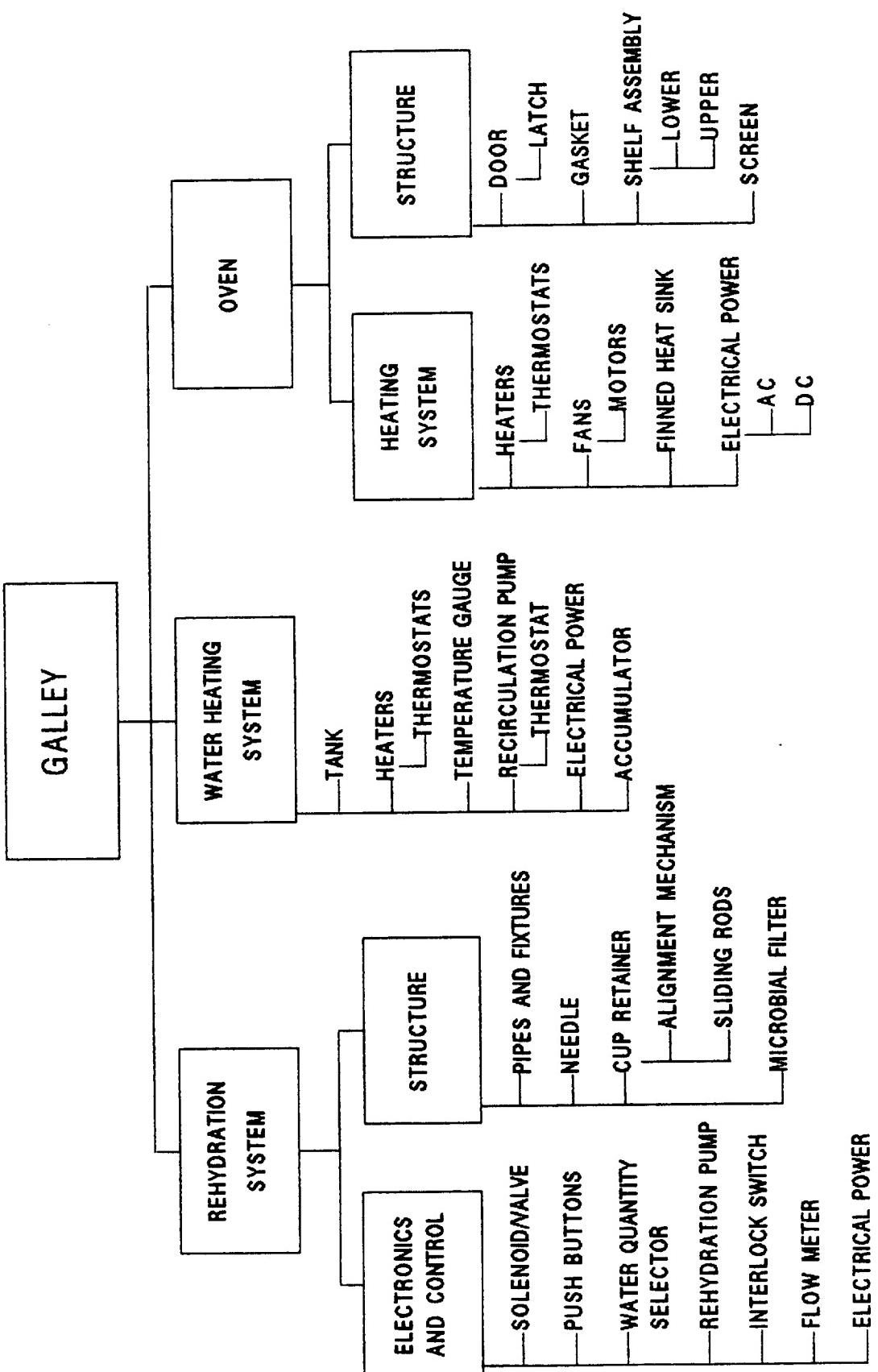


Figure 36: Galley Hierarchy

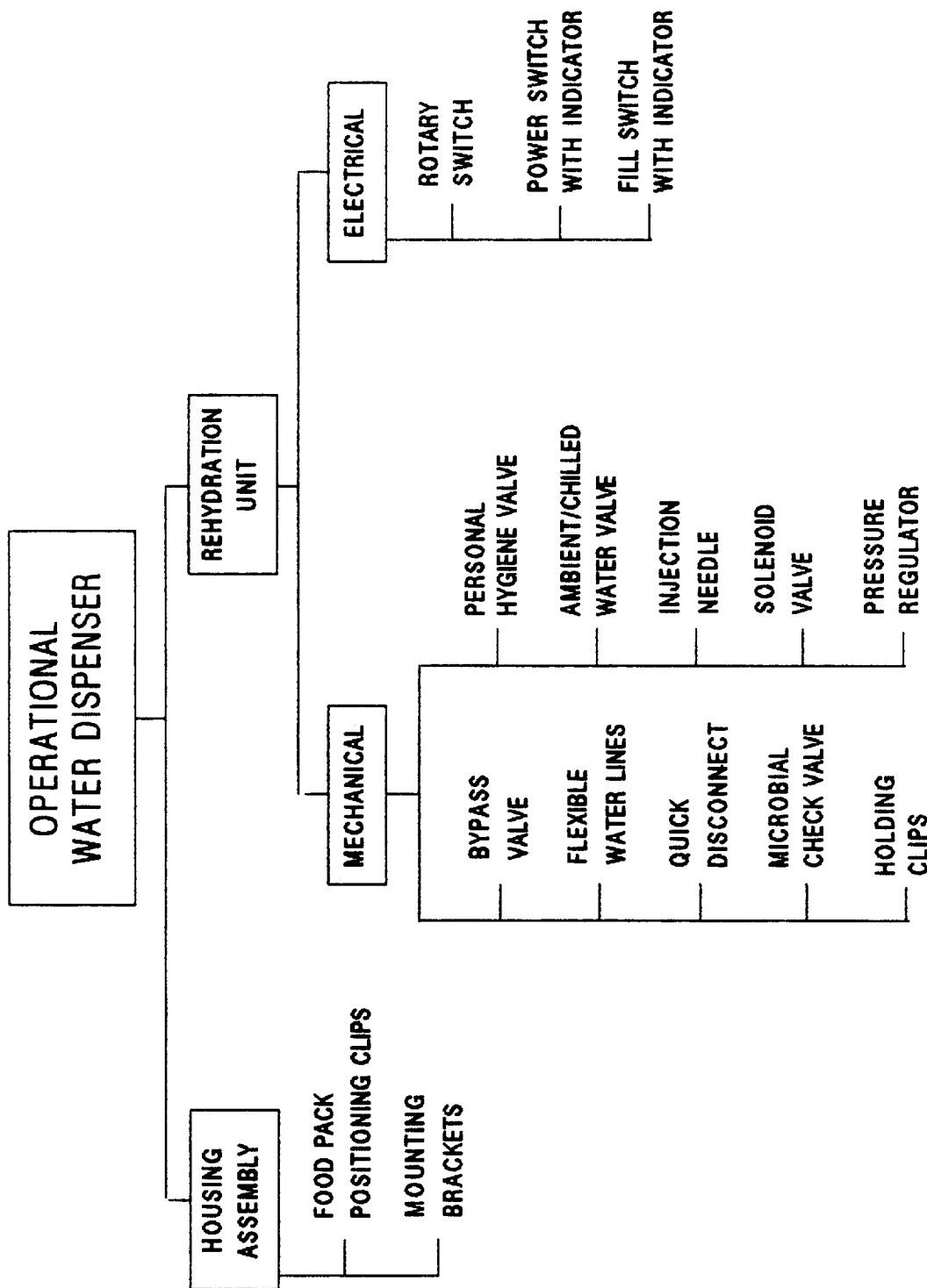


Figure 37: OWDA Hierarchy

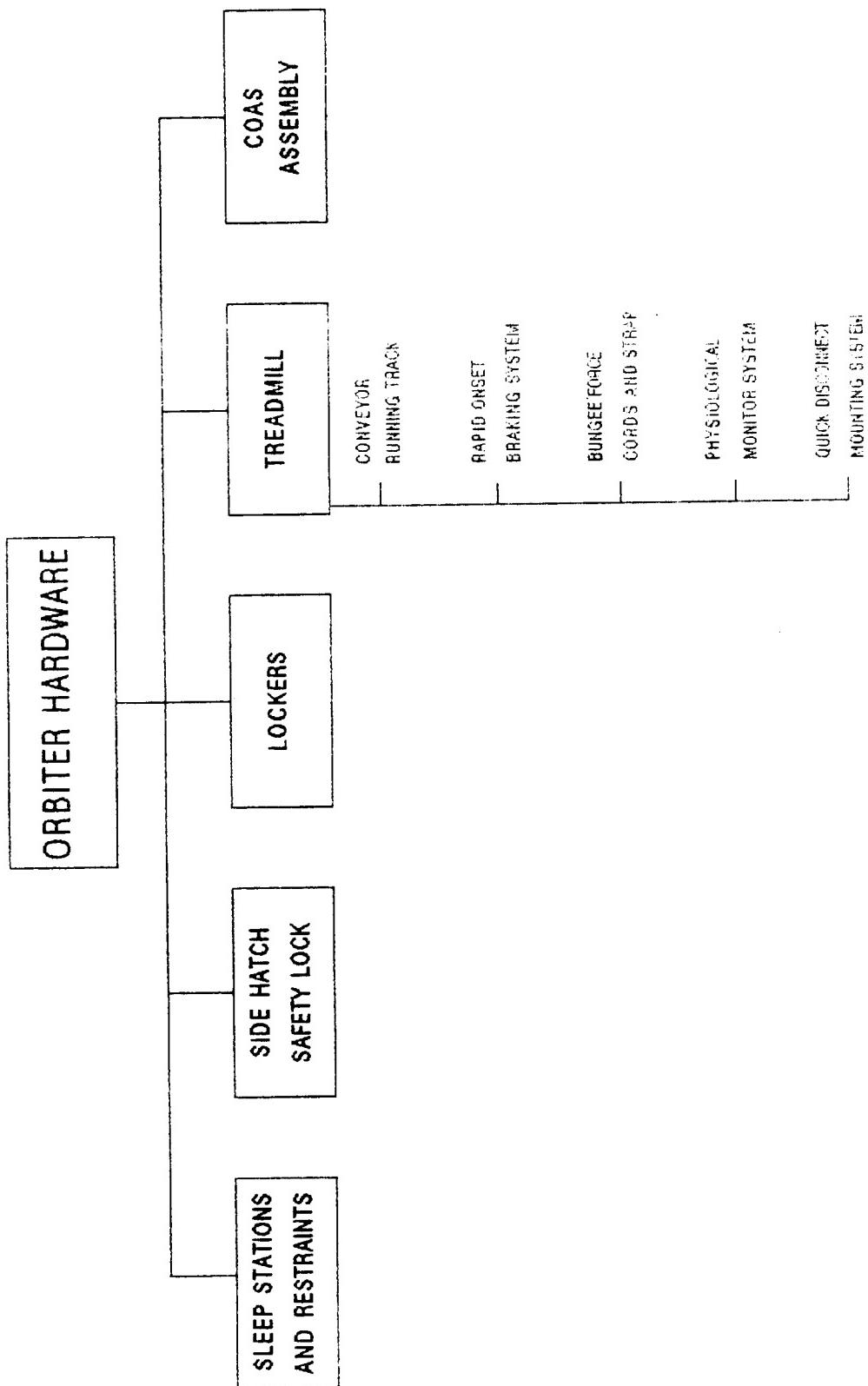


Figure 38: Orbiter Hardware Hierarchy  
41

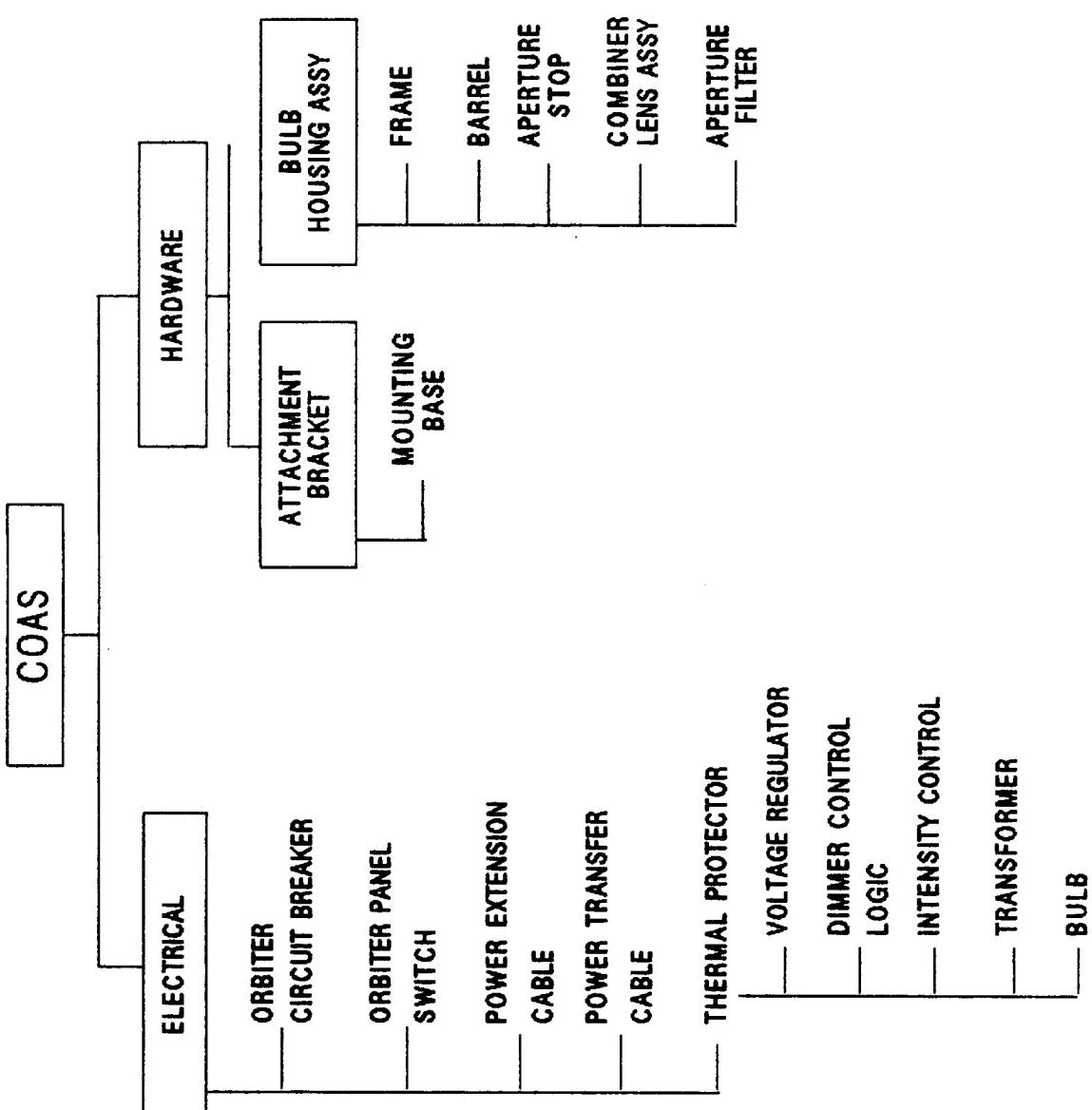


Figure 39: COAS Hierarchy  
42

#### 4.0 ANALYSIS RESULTS - CREW EQUIPMENT

The crew equipment analysis identified 352 failure modes and 78 potential critical items. The failure modes are divided into categories in Table I and the PCIs are presented in Table II.

TABLE I: Summary of CREW EQUIPMENT Failure Modes and Criticalities

Criticality	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
EVA Equipment					40	23	63
EVA Tethers	12	4	1	1	2	11	31
EVA Tools	21	37		3	4	23	88
IVA Tools		1		10		10	21
Food							
Assemblies					21	86	107
Orbiter				5		37	42
Hardware							
	33	42	1	19	67	190	352

TABLE II: Summary of CREW EQUIPMENT Potential Critical Items

	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
EVA Equipment							17
EVA Tethers	12	4	1				60
EVA Tools	21	37		2			1
IVA Tools		1					
Food							
Assemblies							
Orbiter							
Hardware							
	33	42	1	2			78

Each major category is discussed in the following sections. Additionally, a comprehensive listing of the items and associated failure modes are presented at the beginning of Appendix C and the list of potential critical items is given in Appendix D.

##### 4.1 Analysis Results - EVA Equipment

The EVA Equipment Analysis identified 63 failure modes. The number of failure modes for the individual items of equipment is given in Table III.

**TABLE III: Summary of EVA Equipment Failure Modes and Criticalities**

	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
EVA Scissors EMU Light Assembly OBS PFR					3 17 20	2 4 2	5 15 21 22
<b>TOTALS</b>					40	23	63

Of the 63 failure modes, none was judged to be a potential critical item.

#### 4.2 Analysis Results - EVA Tethers

The EVA tether analysis identified 31 failure modes, which are divided among the individual items in Table IV. Of the 31 failure modes, 17 were determined to be potential critical items, as shown on Table V. Of these 17 PCIs, 12 had a 1/1 criticality. The 1/1 criticalities were assigned mainly to failures resulting in an unrestrained, or untethered crewman. All 17 PCIs are listed in Appendix D.

**TABLE IV: Summary of EVA Tether Failure Modes and Criticalities**

	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
EVA Slidewire ERCM Tether Waist Tether	2 5 5	4	1	1	2	9 2	10 14 7
	12	4	1	1	2	11	31

**TABLE V: Summary of EVA Tether Potential Critical Items**

	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
EVA Slidewire ERCM Tether Waist Tether	2 5 5	4	1				7 5 5
<b>TOTALS</b>	12	4	1				17

#### 4.3 Analysis Results - EVA Tools

The EVA tools analysis identified 88 failure modes, which are divided among the EVA tools as given in Table VI. Of the 88 failure modes, 60 were judged to be potential critical items with 21 having 1/1 criticalities. These high criticalities are due mainly to the designed use of the tools for contingency payload bay operations. The PCIs are divided into categories in Table VII and listed in Appendix D.

TABLE VI: Summary of EVA Tool Failure Modes and Criticalities

	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
Tube Cutter							
Centerline		9		2		3	14
Latch Bypass							
Tool	3			1		5	9
3 Point Latch						1	9
Tool	8					4	18
EVA Winch &							
Mount Asm.		14					
EVA Winch						3	10
Adapter					1	3	17
PRD	10		7				
EVA Cable			3				
Cutter					3		3
Snatch Block						4	8
Assembly		4					
<b>TOTAL</b>	<b>21</b>	<b>37</b>		<b>3</b>	<b>4</b>	<b>23</b>	<b>88</b>

**TABLE VII: Summary of EVA Tool Potential Critical Items**

	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
Tube Cutter		9		2			11
Centerline Latch	3						3
3 Point Latch	8						8
EVA Winch & Mount		14					14
EVA Winch Adapter		7					7
PRD	10	3					13
EVA Cable Cutter		4					4
Snatch Block							
<b>TOTAL</b>	<b>21</b>	<b>37</b>		<b>2</b>			<b>60</b>

#### **4.4 Analysis Results - IVA Tools**

The IVA tools analysis identified 21 failure modes. Of the 21, only one, a failure of the locker removal tool, was judged to be a potential critical item. The failure modes are distributed among the three categories in Table VIII.

**TABLE VIII: Summary of IVA Tool Failure Modes and Criticalities**

	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
Turnbuckle Locker Removal Tool		1				2	2
IFM Breakout Box				10		8	18
<b>TOTALS</b>		<b>1</b>		<b>10</b>		<b>10</b>	<b>21</b>

#### **4.5 Analysis Results - Food Assemblies**

The analysis of the food assemblies identified 107 failure modes, none of which was found to be a potential critical item. The failure modes are distributed between the three items of equipment in Table IX.

**TABLE IX: Summary of Food Assembly Failure Modes and Criticalities**

	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
Galley					3	78	81
OWDA					16	7	23
CWDA					2	1	3
<b>TOTALS</b>					21	86	107

#### **4.6 Analysis Results - Orbiter Hardware**

Analysis of the orbiter hardware identified 42 failure modes, none of which was found to be a potential critical item. The failure modes are distributed among the five items of equipment in Table X.

**TABLE X: Summary of Orbiter Hardware Failure Modes and Criticalities**

	1/1	2/1R	2/2	3/1R	3/2R	3/3	TOTAL
Sleep Station/ Restraints						15	15
Side Hatch				2			2
Safety Lock				2		2	4
Locker				1		8	9
Treadmill						12	12
COAS							
<b>TOTALS</b>				5		37	42

## **5.0 REFERENCES**

Reference documentation available from NASA and Rockwell was used in the analysis. The documentation used included the following:

1. NSTS 22206 Instructions for preparation of Failure Modes and Effects Analysis (FMEA) and Critical Items List (CIL), Change No. 2, 4-6-87.
2. V602-660302 EO A-09, Turnbuckle, 4-23-85.
3. V625-650899 EO A-02, Locker Removal Tool, 1-25-79.
4. 10131-10031, Treadmill Exerciser Assembly, 9-25-84.
5. V620-660810 EO D-05, Crewman Optical Alignment Sight Assembly, 1-31-86.
6. V620-660730 EO A-09, COAS Aft Bracket, 11-21-85.
7. V620-660720 EO B-02, COAS Forward Bracket, 7-26-85.
8. SED 48101600 Rev A, Operational Water Dispenser Assembly, 2-10-83.
9. V602-660604 EO B-17, Locker Assembly, 11-8-84.
10. SED 48101607 Rev A, Contingency Water Dispenser Assembly, 8-18-82.
11. SED 33102357 Rev A DCN 8-5-82, Snatch Block Assembly, 8-5-82.
12. 10159-20076, EVA Scissors Assembly, 5-9-83.
13. SED 33102348 Rev A, EVA Winch Adapter, 12-1-81.
14. SED 33101368 DCN 3/28/83, EVA Tube Cutter Assembly, 3-28-83.
15. SED33101621 DCN 1/25/83, Centerline Latch Tool Assembly, 1-25-83.
16. SED 33101327 Rev C, Three Point Latch Tool Assembly, 5-5-84.
17. SED 33101570, EVA Winch and Mount Assembly, 2-16-80.
18. 10163-10063, Payload Retention Device, 1-12-82.
19. 10134-20001, In-Flight Maintenance Breakout Box, 4-2-85.
20. V617-544702, EVA Operational Slidewire System Link 7-8-82.
21. M072-544700, EVA Operational Slidewire System Technical Order Installation Drawing, 9-23-82.

22. V617-544701, EVA Operational Slidewire System Yoke, 7-7-82.
23. V617-544720, EO B-01 EVA Operational Slidewire, 7-22-85
24. 10161-10061, EMU Lights Assembly, 5-2-81.
25. 10161-60029, EMU Light Sequencer Mark IV Schematic, 11-29-83.
26. 10161-20033, Gimbal Assembly: EMU Lights Assembly, 4-29-81.
27. 10161-20001, Single Cell Battery Module: EMU Light Assembly, 4-18-81.
28. SED 42100961, Operational Bioinstrumentation System EVA Cable Assembly, 10-10-84.
29. 10162-10062 EO 101-374, Extended Range Crew Member Safety Tether Assembly, 8-30-85.
30. 10151-20040, Waist Tether Assembly, 1-23-80.
31. 10159-10034, Portable Foot Restraint Platform Assembly, 1-25-85.
32. 10155-20003, Portable Foot Restraint Boom Assembly, 11-1-82.
33. 10155-20004, Portable Foot Restraint Centerline Clamp Assembly, 3-7-85.
34. 10155-10035, Portable Foot Restraint Articulating Socket Assembly, 5-7-82.
35. V601-669100 Rev B, Sleep Station Restraint Assembly, 2-14-84.
36. JSC 20466, EVA Catalog Tools and Equipment, 11-4-85.
37. JSC 12770, Shuttle Flight Operations Manual Vol. 12, Crew Systems, Basic Rev A, 8-16-85.
38. SSSH 9.5, Crew Optical Alignment Sight Assembly, 10-18-83.
39. JSC-20365, Food System and Dining Workbook.
40. JSC-17321, FDF: IFM Checklist.
41. EVA Prep/Post 2102 Training Workbook.
42. JSC-12770, Shuttle Flight Operations Manual Vol. 15, EVA Systems, Basic Rev. A, 1-6-84
43. SED 33103383 Rev A, Side Hatch Safety Lock, 5-15-85.



**APPENDIX A**  
**ACRONYMS**

## APPENDIX A ACRONYMS

AOA	- Abort-Once-Around
ASE	- Aerospace Support Equipment
ATO	- Abort-To-Orbit
C&W	- Caution and Warning
CIL	- Critical Items List
COAS	- Crew Optical Alignment Sight
CWDA	- Contingency Water Dispenser Assembly
dc	- Direct Current
EMU	- Extravehicular Mobility Unit
ERCM	- Extended Range Crew Member
EVA	- Extravehicular Activity
F	- Fahrenheit
F	- Functional
FMEA	- Failure Modes and Effects Analysis
FSSR	- Flight Systems Software Requirements
GFE	- Government Furnished Equipment
GPC	- General Purpose Computer
HW	- Hardware
IFM	- In-Flight Maintenance
IMU	- Inertial Measurement Unit
IOA	- Independent Orbiter Assessment
IUS	- Inertial Upper Stage
IVA	- Intravehicular Activity
JSC	- Johnson Space Center
LED	- Light Emitting Diode
MDAC	- McDonnell Douglas Astronautics Company
NA	- Not Applicable
NSTS	- National Space Transportation System
OBS	- Operational Bioinstrumentation System
OWDA	- Operational Water Dispenser Assembly
PCI	- Potential Critical Item
PFR	- Portable Foot Restraint
PHS	- Personal Hygiene Station
PLBD	- Payload Bay Door
PRCBD	- Program Requirements Control Board Directive
PRD	- Payload Retention Device
PSA	- Provision Stowage Assembly
psi	- Pounds per Square Inch
QD	- Quick Disconnect
RHS	- Rehydration Station
RMS	- Remote Manipulator System
RTLS	- Return-to-Launch Site

SFOM	- Shuttle Flight Operations Manual
SM	- Systems Management
SOP	- Secondary Oxygen Pack
SSSH	- Space Shuttle Systems Handbook
STS	- Space Transportation System
TAL	- Transatlantic Abort Landing
V	- Volt



## **APPENDIX B**

### **DEFINITIONS, GROUND RULES, AND ASSUMPTIONS**

- B.1 Definitions**
- B.2 Project Level Ground Rules and Assumptions**
- B.3 Subsystem-Specific Ground Rules and Assumptions**

## B.1 Definitions

Definitions contained in NSTS 22206, Instructions For Preparation of FMEA/CIL, 10 October 1986, change 2, 6 April 1987, were used with the following amplifications and additions.

### INTACT ABORT DEFINITIONS:

RTLS - begins at transition to OPS 6 and ends at transition to OPS 9, post-flight

TAL - begins at declaration of the abort and ends at transition to OPS 9, post-flight

AOA - begins at declaration of the abort and ends at transition to OPS 9, post-flight

ATO - begins at declaration of the abort and ends at transition to OPS 9, post-flight

CREDIBLE (CAUSE) - an event that can be predicted or expected in anticipated operational environmental conditions. Excludes an event where multiple failures must first occur to result in environmental extremes

CONTINGENCY CREW PROCEDURES - procedures that are utilized beyond the standard malfunction procedures, pocket checklists, and cue cards

EARLY MISSION TERMINATION - termination of onorbit phase prior to planned end of mission

EFFECTS/RATIONALE - description of the case which generated the highest criticality

HIGHEST CRITICALITY - the highest functional criticality determined in the phase-by-phase analysis

MAJOR MODE (MM) - major sub-mode of software operational sequence (OPS)

MC - Memory Configuration of Primary Avionics Software System (PASS)

MISSION - assigned performance of a specific Orbiter flight with payload/objective accomplishments including orbit phasing and altitude (excludes secondary payloads such as GAS cans, middeck P/L, etc.)

MULTIPLE ORDER FAILURE - describes the failure due to a single cause or event of all units which perform a necessary (critical) function

OFF-NOMINAL CREW PROCEDURES - procedures that are utilized beyond the standard malfunction procedures, pocket checklists, and cue cards

OPS - software operational sequence

PRIMARY MISSION OBJECTIVES - worst case primary mission objectives are equal to mission objectives

PHASE DEFINITIONS:

PRELAUNCH PHASE - begins at launch count-down Orbiter power-up and ends at moding to OPS Major Mode 102 (liftoff)

LIFTOFF MISSION PHASE - begins at SRB ignition (MM 102) and ends at transition out of OPS 1 (Synonymous with ASCENT)

ONORBIT PHASE - begins at transition to OPS 2 or OPS 8 and ends at transition out of OPS 2 or OPS 8

DEORBIT PHASE - begins at transition to OPS Major Mode 301 and ends at first main landing gear touchdown

LANDING/SAFING PHASE - begins at first main gear touchdown and ends with the completion of post-landing safing operations

## B.2 IOA Project Level Ground Rules and Assumptions

The philosophy embodied in NSTS 22206, Instructions for Preparation of FMEA/CIL, 10 October 1986, change 2, 6 April 1987 was employed with the following amplifications and additions.

1. The operational flight software is an accurate implementation of the Flight System Software Requirements (FSSRs).

RATIONALE: Software verification is out-of-scope of this task.

2. After liftoff, any parameter which is monitored by system management (SM) or which drives any part of the Caution and Warning System (C&W) will support passage of Redundancy Screen B for its corresponding hardware item.

RATIONALE: Analysis of on-board parameter availability and/or the actual monitoring by the crew is beyond the scope of this task.

3. Any data employed with flight software is assumed to be functional for the specific vehicle and specific mission being flown.

RATIONALE: Mission data verification is out-of-scope of this task.

4. All hardware (including firmware) is manufactured and assembled to the design specifications/drawings.

RATIONALE: Acceptance and verification testing is designed to detect and identify problems before the item is approved for use.

5. All Flight Data File crew procedures will be assumed performed as written, and will not include human error in their performance.

RATIONALE: Failures caused by human operational error are out-of-scope of this task.

6. All hardware analyses will, as a minimum, be performed at the level of analysis existent within NASA/Prime Contractor Orbiter FMEA/CILs, and will be permitted to go to greater hardware detail levels but not lesser.

RATIONALE: Comparison of IOA analysis results with other analyses requires that both analyses be performed to a comparable level of detail.

7. Verification that a telemetry parameter is actually monitored during AOS by ground-based personnel is not required.

RATIONALE: Analysis of mission-dependent telemetry availability and/or the actual monitoring of applicable data by ground-based personnel is beyond the scope of this task.

8. The determination of criticalities per phase is based on the worst case effect of a failure for the phase being analyzed. The failure can occur in the phase being analyzed or in any previous phase, whichever produces the worst case effects for the phase of interest.

RATIONALE: Assigning phase criticalities ensures a thorough and complete analysis.

9. Analysis of wire harnesses, cables, and electrical connectors to determine if FMEAs are warranted will not be performed nor FMEAs assessed.

RATIONALE: Analysis was substantially complete prior to NSTS 22206 ground rule redirection.

10. Analysis of welds or brazed joints that cannot be inspected will not be performed nor FMEAs assessed.

RATIONALE: Analysis was substantially complete prior to NSTS 22206 ground rule redirection.

11. Emergency system or hardware will include burst discs and will exclude the EMU Secondary Oxygen Pack (SOP), pressure relief valves and the landing gear pyrotechnics.

RATIONALE: Clarify definition of emergency systems to ensure consistency throughout IOA project.

### **B.3 Crew Equipment Specific Ground Rules and Assumptions**

The IOA analysis was performed to the component or assembly level of the crew equipment subsystem. The analysis considered the worst case effects of the hardware or functional failure on the subsystem, mission, and crew and vehicle safety.

1. Waist tether is used to fasten a crewmember to either a workstation or to the ERCM safety tether. It is not used to restrain tools.

RATIONALE: Worst case possibility.

2. The Operational Bioinstrumentation System (OBS) will be considered as a non-mandatory item for EVA operations. Failure of the OBS while monitoring an IVA crewmember can require the Flight Surgeon to terminate the mission. Thus, IVA usage is more critical.

RATIONALE: IVA crewmembers are hooked to the OBS only at the request of the Flight Surgeon. If a crewmember's health cannot be monitored, the Flight Surgeon has the option of terminating the mission.

3. Crew actions, planned and unplanned, are considered viable alternatives for overcoming failures and reducing criticalities.

RATIONALE: Crew equipment is designed to permit this capability.

4. "Normally expected environmental conditions" precludes the existence of contamination in all water lines.

RATIONALE: Interpretation and application of redundancy screen C.

5. Lockers are assumed to contain emergency, lifesaving, or IFM critical equipment.

RATIONALE: Worst case possibility.

6. Crew equipment failures discovered prior to launch will be corrected prelaunch.

RATIONALE: Interpretation of flight rules.

7. RMS jettison is considered unlike redundancy to RMS stowing.

RATIONALE: Definition of redundancy.

8. The EMU lights are not designated as mandatory items during EVA.

RATIONALE: Definition of mandatory versus non-mandatory requirements.

9. The failure of an EVA tether such that the crewmember is unrestrained will be assigned a "1/1" criticality.

RATIONALE: Worst case possibility

10. Certain galley and OWDA failures can result in free water in the cabin. It is not a part of this task to identify the hazards that free water can pose to other on-board systems.

RATIONALE: This should be addressed by a "hazard analysis".

11. Complete loss of the galley will not terminate a mission as long as alternate water sources are available.

RATIONALE: The FDF contains procedures to bypass the galley for water if required. Other galley functions are not required for completion of mission.



**APPENDIX C**  
**ANALYSIS WORKSHEETS AND SUMMARY TABLES**

## APPENDIX C DETAILED ANALYSIS

This section contains the IOA analysis worksheets employed during the analysis of the Crew Equipment subsystem. The information on these worksheets is intentionally similar to the FMEA's written by Rockwell and the NASA. Each of these sheets identifies the item being analyzed, and parent assembly, as well as the function. For each failure mode, the possible causes are outlined, and the assessed hardware and functional criticality for each mission phase is listed, as described in the Rockwell Desk Instructions 100-2G. Finally, effects are entered at the bottom of each sheet, and the worst case criticality is entered at the top.

### LEGEND FOR IOA ANALYSIS WORKSHEETS

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#### Hardware Criticalities :

- 1 = Loss of life or vehicle
- 2 = Loss of mission
- 3 = Non loss of life or vehicle or mission

#### Functional Criticalities :

- 1R = Redundant identical hardware components or redundant functional paths all of which, if failed, could cause loss of life or vehicle.
- 2R = Redundant identical hardware components or redundant functional paths all of which, if failed, could cause loss of mission.

#### Redundancy Screen A :

- 1 = Is Checked Out PreFlight
- 2 = Is Capable of Check Out PreFlight
- 3 = Not Capable of Check Out PreFlight
- 4 = Do Not Know

#### Redundancy Screens B and C :

- P = Passed Screen
- F = Failed Screen
- NA = Not Applicable

Preceding the analysis worksheets are summary tables containing a listing of all identified failures and associated criticalities. These summary tables can be used as a quick reference to identify the desired failure number, then the analysis worksheet can be referenced for more complete information.

EVA EQUIPMENT ANALYSIS WORKSHEETS SUMMARY

MDAC-ID	CRITICALITY		REDUNDANCY			ITEM NAME
	FLIGHT H/F	ABORT H/F	SCREENS			
	A	B	C			
1100	3/3	/NA				EVA SCISSORS - SPRING
1101	3/2R	/NA	P P P			EVA SCISSORS - BLADE
1102	3/2R	/NA	P P P			EVA SCISSORS - BLADES
1103	3/3	/NA				EVA SCISSORS LOCKING BAR
1104	3/2R	/NA	P P P			EVA SCISSORS HINGE PIN
1200	3/3	/NA				EMU LIGHT ASSEMBLY - SEQNCING.
1201	3/3	/NA				EMU LIGHT ASSEMBLY - SEQNCING.
1202	3/3	/NA				EMU LIGHT ASSEMBLY - SEQNCING.
1203	3/3	/NA				EMU LIGHT ASSEMBLY - SEQNCING.
1204	3/3	/NA				EMU LIGHT ASSEMBLY - SEQNCING.
1205	3/3	/NA				EMU LIGHT ASSEMBLY - BULB
1206	3/3	/NA				EMU LIGHT ASSEMBLY-GIMBAL
1207	3/3	/NA				EMU LIGHT ASSEMBLY-GIMBAL
1208	3/3	/NA				EMU LIGHT ASSEMBLY-GIMBAL
1209	3/3	/NA				EMU LIGHT ASMBLY-HELMET LATCH
1210	3/3	/NA				EMU LIGHT ASMBLY-HELMET LATCH
1211	3/3	/NA				EMU LIGHT ASMBLY-CROSS MEMBER
1212	3/3	/NA				EMU LIGHT ASSEMBLY-BATTERY
1213	3/3	/NA				EMU LIGHT ASSEMBLY-BATTERY
1214	3/3	/NA				EMU LIGHT ASSEMBLY-BATTERY
1300	3/2R	/NA	P N P			OBS-SIGNAL CONDITIONER
1301	3/2R	/NA	P N P			OBS-SGNL. COND.-BATTERY
1302	3/2R	/NA	P N P			OBS-SGNL. COND.-ON/OFF SW.
1303	3/2R	/NA	P N P			OBS-SGNL. COND.-GAIN
1304	3/2R	/NA	P N P			OBS-SGNL. COND.-INPUT PORT
1305	3/2R	/NA	P N P			OBS-SGNL. COND.-OUTPUT PORT
1306	3/2R	/NA	P N P			OBS-SGNL. COND.-ESP
1307	3/3	/NA				OBS - BIOMED BELT
1308	3/2R	/NA	P N P			OBS - ELECTRODE HARNESS WIRES
1309	3/2R	/NA	P N P			OBS - ELECTRODES
1310	3/2R	/NA	P N P			OBS - ELECTRODE HARNESS
1311	3/2R	/NA	P N P			OBS - ELECTRODE HARNESS - PIN
1312	3/3	/NA				OBS - EVA BIOMED CABLE
1313	3/3	/NA				OBS - EVA BIOMED CABLE - PINS
1314	3/2R	/NA	P N P			OBS - IVA BIOMED CABLE
1315	3/2R	/NA	P N P			OBS - IVA BIOMED CABLE - PINS
1316	3/2R	/NA	P N P			BIOMED CHANNEL SWITCH
1317	3/3	/NA				BIOMED CHANNEL SWITCH
1318	3/2R	/NA	P N P			BIOMED PANEL CABLE
1319	3/2R	/NA	P N P			BIOMED PANEL CABLE - PINS
1320	3/2R	/NA	P N P			BIOMED PANEL CABLE-SHTL. INTER.

(\*) Potential Critical Items.

EVA EQUIPMENT ANALYSIS WORKSHEETS SUMMARY

MDAC-ID	CRITICALITY		REDUNDANCY			ITEM NAME
	FLIGHT H/F	ABORT H/F	SCREENS A B C			
1400	3/2R	/NA	P P P			PFR-PLATFORM ASMBLY. KNOB
1401	3/2R	/NA	P P P			PFR-PLATFORM ASMBLY. PLATES
1402	3/3	/NA				PFR-PLATFORM ASMBLY. TOE BAR
1403	3/2R	/NA	P P P			PFR-PLATFORM ASMBLY. HEEL LOCK
1404	3/2R	/NA	P P P			PFR-PLATFORM ASMBLY. HEEL LOCK
1410	3/2R	/NA	P P P			PFR-BOOM ASMBLY. INBOARD CLAMP
1411	3/2R	/NA	P P P			PFR-BOOM ASMBLY. OUTBOARD CLAMP
1412	3/2R	/NA	P P P			PFR-BOOM ASMBLY. PLTFRM. CLAMP
1413	3/2R	/NA	P P P			PFR-BOOM ASMBLY. PLTFRM. CLAMP
1414	3/2R	/NA	P P P			PFR-BOOM ASMBLY. QUICK REL. PIN
1415	3/2R	/NA	P P P			PFR-BOOM ASMBLY. QUICK REL. PIN
1416	3/2R	/NA	P P P			PFR-BOOM ASMBLY. TUBES
1417	3/2R	/NA	P P P			PFR-BOOM ASMBLY. TORQUE LIMIT.
1418	3/2R	/NA	P P P			PFR-BOOM ASMBLY. TORQUE LIMIT.
1420	3/2R	/NA	P P P			PFR-CNTRLINE CLAMP ASMBLY. PIN
1421	3/2R	/NA	P P P			PFR-CNTRLINE CLAMP ASMBLY. PIN
1422	3/3	/NA				PFR-CNTRLINE CLAMP ASMBLY TABS
1423	3/2R	/NA	P P P			PFR-CNTRLINE CLAMP ASMBLY JAWS
1424	3/2R	/NA	P P P			PFR-CNTRLINE CLAMP ASMBLY KNOB
1430	3/2R	/NA	P P P			PFR-ART. SOCKET KNOB
1431	3/2R	/NA	P P P			PFR-ART. SOCKET PLATES
1432	3/2R	/NA	P P P			PFR-ART. SOCKET QUICK REL. PIN

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(\*) Potential Critical Items.

EVA TETHERS ANALYSIS WORKSHEETS SUMMARY

MDAC-ID	CRITICALITY REDUNDANCY			ITEM NAME
	FLIGHT H/F	ABORT H/F	SCREENS A B C	
2100	3/2R	/NA	P P P	EVA SLIDEWIRE ASSEMBLY-SLIDE
2101 *	1/1	/NA		EVA SLIDEWIRE ASSEMBLY-SLIDE
2102	3/2R	/NA	P N P	EVA SLIDEWIRE ASSEMBLY-SLIDE
2103 *	2/2	/NA		EVA SLIDEWIRE ASSEMBLY-STOP
2104 *	2/1R	/NA	P P P	EVA SLIDEWIRE-END FITTINGS
2105 *	2/1R	/NA	P P P	EVA SLIDEWIRE ASMBLY-COTTR PIN
2106	3/1R	/NA	P P P	EVA SLIDEWIRE ASSEMBLY-QD PIN
2107 *	2/1R	/NA	P P P	EVA SLIDEWIRE ASSEMBLY-QD PIN
2108 *	2/1R	/NA	P P P	EVA SLIDEWIRE ASSEMBLY-SUPPORT
2109 *	1/1	/NA		EVA SLIDEWIRE
2200 *	1/1	/NA		ERCM TETHER - SMALL HOOK
2201	3/3	/NA		ERCM TETHER - SMALL HOOK
2202	3/3	/NA		ERCM TETHER - SMALL HOOK
2203 *	1/1	/NA		ERCM TETHER - CABLE
2204 *	1/1	/NA		ERCM TETHER-CABLE ATTACH PTS.
2205 *	1/1	/NA		ERCM TETHER - REEL CASE
2206	3/3	/NA		ERCM TETHER-CABLE TAKE UP ASM.
2207	3/3	/NA		ERCM TETHER-CABLE TAKE UP ASM.
2208	3/3	/NA		ERCM TETHER-CABLE TAKE UP ASM.
2209	3/3	/NA		ERCM TETHER-CABLE TAKE UP ASM.
2210	3/3	/NA		ERCM TETHER-LOCK/UNLOCK SEL SW
2211	3/3	/NA		ERCM TETHER-LOCK/UNLOCK SEL SW
2212 *	1/1	/NA		ERCM SAFETY TETHER-"D" RING
2213	3/3	/NA		ERCM SAFETY TETHER-"D" RING
2300 *	1/1	/NA		WAIST TETHER-HOOKS
2301	3/3	/NA		WAIST TETHER-HOOKS
2302	3/3	/NA		WAIST TETHER-HOOKS
2303 *	1/1	/NA		WAIST TETHER-HOOKS
2304 *	1/1	/NA		WAIST TETHER-NOMEX WEBBING
2305 *	1/1	/NA		WAIST TETHER-NOMEX WEBBING
2306 *	1/1	/NA		WAIST TETHER-NOMEX WEBBING

(\*) Potential Critical Items.

EVA TOOLS ANALYSIS WORKSHEETS SUMMARY

MDAC-ID	CRITICALITY REDUNDANCY			ITEM NAME
	FLIGHT		ABORT	
	H/F	H/F	SCREENS	
3100 *	2/1R	/NA	P P P	TUBE CUTTER CUTTING WHEEL
3101 *	2/1R	/NA	P P P	TUBE CUTTER CUTTING WHEEL
3102 *	2/1R	/NA	P P P	TUBE CUTTER CUTNG. WHEEL SLIDE
3103 *	2/1R	/NA	P P P	TUBE CUTTER RATCHET WHEEL
3104 *	2/1R	/NA	P P P	TUBE CUTTER SMALL RATCHET ASMB
3105 *	2/1R	/NA	P P P	TUBE CUTTER SMALL RATCHET ASMB
3106 *	3/1R	/NA	P F P	TUBE CUTTER PAWL
3107 *	3/1R	/NA	P F P	TUBE CUTTER PAWL
3108	3/3	/NA		TUBE CUTTER SPRING-ASTD. ROLLER
3109 *	2/1R	/NA	P P P	TUBE CUTTER ROLLER LINK
3110	3/3	/NA		TUBE CUTTER IDLER ROLLER
3111 *	2/1R	/NA	P P P	TUBE CUTTER LRG RATCHET HANDLE
3112 *	2/1R	/NA	P P P	TUBE CUTTER SML RATCHET HANDLE
3113	3/3	/NA		TUBE CUTTER SOFT-TIP SET SCREW
3200	3/3	/NA		CNTRLN LATCH BYPASS TOOL REL
3201	3/3	/NA		CNTRLN LATCH BYPASS TOOL LATCH
3202	3/1R	/NA	P P P	CNTRLN LATCH BYPASS TOOL LATCH
3203 *	1/1	/NA		CNTRLN LATCH BYPASS TOOL LATCH
3204 *	1/1	/NA		CNTRLN LATCH BYPASS TOOL WHEEL
3205	3/3	/NA		CNTRLN LATCH BYPASS REL TRIGGER
3206 *	1/1	/NA		CNTRLN LATCH BYPASS RATCHET HND
3207	3/3	/NA		CNTRLN LATCH BYPASS REL CATCH
3208	3/3	/NA		CNTRLN LATCH BYPASS REL TAB
3300 *	1/1	/NA		3-POINT LATCH TOOL RTCHT HANDL
3301 *	1/1	/NA		3-POINT LATCH TOOL HOOK
3302 *	1/1	/NA		3-POINT LATCH TOOL RTCHT WHEEL
3303 *	1/1	/NA		3-POINT LATCH TOOL RTCHT WHEEL
3304 *	1/1	/NA		3-POINT LATCH TOOL RTCHT WHEEL
3305	3/3	/NA		3-POINT LATCH TOOL ROLLER SHOE
3306 *	1/1	/NA		3-POINT LATCH TOOL ROLLER SHOE
3307 *	1/1	/NA		3-POINT LATCH TOOL COMPENSATOR
3308 *	1/1	/NA		3-POINT LATCH TOOL ROLLER SHOE
3400 *	2/1R	/NA	P P P	EVA WINCH & MOUNT ASMBLY HANDLE
3401 *	2/1R	/NA	P P P	EVA WINCH & MOUNT ASMBLY RTCHT
3402 *	2/1R	/NA	P P P	EVA WINCH & MOUNT ASMBLY RTCHT
3403 *	2/1R	/NA	P P P	EVA WINCH & MNT ASM LRG CON HND
3404 *	2/1R	/NA	P P P	EVA WINCH & MNT ASM LRG CON HND
3405 *	2/1R	/NA	P P P	EVA WINCH & MNT RATCHET HANDLE
3406 *	2/1R	/NA	P P P	EVA WINCH & MNT ASMBLY ROPE
3407 *	2/1R	/NA	P P P	EVA WINCH & MOUNT ASMBLY ROPE
3408	3/3	/NA		EVA WINCH & MNT ASMBLY TORQ LMT
3409 *	2/1R	/NA	P P P	EVA WINCH & MNT ASM RTCHT WHEEL
3410	3/3	/NA		EVA WINCH & MNT ASM ROPE ROLLER

(\*) Potential Critical Items.

EVA TOOLS ANALYSIS WORKSHEETS SUMMARY

MDAC-ID	CRITICALITY		REDUNDANCY			ITEM NAME
	FLIGHT	ABORT	SCREENS			
	H/F	H/F	A	B	C	
3411	3/3	/NA				EVA WINCH & MNT ASM ROPE ROLLER
3412	3/3	/NA				EVA WINCH & MNT ASM HANDLE
3413 *	2/1R	/NA	P	P	P	EVA WINCH & MNT ASM MNTG PLATE
3414 *	2/1R	/NA	P	P	P	EVA WINCH & MNT ASM GEARS
3415 *	2/1R	/NA	P	P	P	EVA WINCH & MTG ASM GEARS
3416 *	2/1R	2/1R	P	F	P	EVA WINCH & MNT ASM PIP PIN
3417 *	2/1R	/NA	P	P	P	EVA WINCH & MNT ASM ROPE SPOOL
3500 *	2/1R	/NA	P	P	P	EVA WINCH ADAPTER ASM ROPE
3501 *	2/1R	/NA	P	P	P	EVA WINCH ADAPTER ASM ROPE
3502 *	2/1R	/NA	P	P	P	EVA WINCH ADAPTER ASM HOOK
3503	3/3	/NA				EVA WINCH ADAPTER ASM HOOK LTC
3504 *	2/1R	/NA	P	P	P	EVA WINCH ADAPTER ASM ROPE CAM
3505 *	2/1R	/NA	P	P	P	EVA WINCH ADAPTER ASM ROPE CAM
3506 *	2/1R	/NA	P	P	P	EVA WINCH ADAPTER ASM ROPE PLT
3507	3/3	/NA				EVA WINCH ADAPTER ASM ROPE RLLR
3508	3/3	/NA				EVA WINCH ADAPTER ASM ROPE RLLR
3509 *	2/1R	/NA	P	P	P	EVA WINCH ADAPTER ASM ROPE SPL
3600 *	2/1R	/NA	P	P	P	PRD ASM RATCHET HANDLE
3601 *	1/1	/NA				PRD ASM HOOK
3602 *	2/1R	/NA	P	P	P	PRD ASM HOOK LATCH
3603 *	2/1R	/NA	P	P	P	PRD ASM HOOK LATCH
3604 *	1/1	/NA				PRD ASM RATCHET GEAR
3605 *	1/1	/NA				PRD ASM RATCHET GEAR
3606 *	1/1	/NA				PRD ASM KEVLAR WEB STRAP
3607	3/3	/NA				PRD ASM REACTION HANDLE
3608 *	1/1	/NA				PRD ASM RATCHET SHAFT PIN
3609	3/3	/NA				PRD ASM WEB ROLLER
3610	3/3	/NA				PRD ASM WEB ROLLER
3611	3/2R	/NA	P	P	P	PRD ASM SPRING STORAGE REEL
3612 *	1/1	/NA				PRD ASM RATCHET LATCH
3613 *	1/1	/NA				PRD ASM RATCHET LATCH
3614 *	1/1	/NA				PRD ASM RATCHET ASM RELEASE
3615 *	1/1	/NA				PRD ASM RATCHET ASM RELEASE
3616 *	1/1	/NA				PRD ASM HOOK/WEB CONNECT PIN
3700	3/2R	/NA	P	P	P	EVA CABLE CUTTER
3701	3/2R	/NA	P	P	P	EVA CABLE CUTTER
3702	3/2R	/NA	P	P	P	EVA CABLE CUTTER
3800 *	2/1R	/NA	P	P	P	SNATCH BLOCK ASM HOOK LATCH
3801 *	2/1R	/NA	P	P	P	SNATCH BLOCK ASM HOOK SWIVEL
3802	3/3	/NA				SNATCH BLOCK ASM R SPRG PLUNGER
3803	3/3	/NA				SNATCH BLOCK ASM L SPRG PLUNGER
3804	3/3	/NA				SNATCH BLOCK ASM PULL WIRE END
3805 *	2/1R	/NA	P	P	P	SNATCH BLOCK ASM HOOK LATCH BLK
3806	3/3	/NA				SNATCH BLOCK ASM PULLEY WHEEL
3807 *	2/1R	/NA	P	P	P	SNATCH BLOCK ASSEMBLY HOOK

(\*) Potential Critical Items.

IVA TOOLS ANALYSIS WORKSHEETS SUMMARY

MDAC-ID	CRITICALITY REDUNDANCY			ITEM NAME
	FLIGHT H/F	ABORT H/F	SCREENS A B C	
4100	3/3	/NA		TURNBUCKLE
4101	3/3	/NA		TURNBUCKLE
4200 *	2/1R	/NA	P P P	LOCKER REMOVAL TOOL
4300	3/1R	/NA	P P P	IFM BRKT BOX INPUT POWER CONN
4301	3/1R	/NA	P P P	IFM BRKT BOX INPUT POWER CONN
4302	3/3	/NA		IFM BRKT BOX AUX ON/OFF SW
4303	3/3	/NA		IFM BRKT BOX AUX ON/OFF SW
4304	3/3	/NA		IFM BRKT BOX OUTPUT POWER CONN
4305	3/3	/NA		IFM BRKT BOX OUTPUT POWER CONN
4306	3/1R	/NA	P P P	IFM BREAKOUT BOX FUSE
4307	3/1R	/NA	P P P	IFM BREAKOUT BOX FUSE HOLDER
4308	3/3	/NA		IFM BRKT BOX AWG OUTPUT SEL SW
4309	3/1R	/NA	P P P	IFM BRKT BOX AWG OUTPUT SEL SW
4310	3/1R	/NA	P P P	IFM BRKT BOX PIN CONN OUTLET
4311	3/3	/NA		IFM BRKT BOX PIN/WIRE HLDG BRAK
4312	3/1R	/NA	P P P	IFM BRKT BOX VAR VOLT POWER SUP
4313	3/1R	/NA	P P P	IFM BRKT BOX VAR VOLT PWR
4314	3/3	/NA		IFM BRKT BOX 28 V/VAR SWITCH
4315	3/1R	/NA	P P P	IFM BRKT BOX 28 V/VAR SWITCH
4316	3/1R	/NA	P P P	IFM BRKT BOX AWG OUTPUT SEL SW
4317	3/3	/NA		IFM BRKT BOX AWG OUTPUT SEL SW

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(\*) Potential Critical Items.

FOOD ASSEMBLIES ANALYSIS WORKSHEETS SUMMARY

MDAC-ID	CRITICALITY		REDUNDANCY			ITEM NAME
	FLIGHT H/F	ABORT H/F	SCREENS			
	H/F	H/F	A	B	C	
5101	3/3	/NA				GALLEY WATER HEATER CB
5102	3/3	/NA				GALLEY DC POWER BUS B SWITCH
5103	3/3	/NA				GALLEY DC POWER BUS B SWITCH
5104	3/3	/NA				GALLEY DC POWER BUS B SWITCH
5105	3/3	/NA				POTABLE WATER HEATER TELEMETRY
5106	3/3	/NA				RECIRCULATION PUMP
5107	3/3	/NA				RECIRCULATION PUMP
5108	3/3	/NA				RECIRCULATION THERMOSTAT
5109	3/3	/NA				RECIRCULATION THERMOSTAT
5110	3/2R	/NA	P P P			HOT WATER TANK
5111	3/3	/NA				WATER TANK HEATERS
5112	3/3	/NA				WATER TANK HEATERS
5113	3/3	/NA				WATER TANK HEATER THERMOSTAT
5114	3/3	/NA				WATER TANK HEATER THERMOSTAT
5115	3/3	/NA				HOT WATER TEMPERATURE GAUGE
5116	3/3	/NA				GALLEY OVEN CIRCUIT BREAKER
5117	3/3	/NA				GALLEY DC POWER BUS A SWITCH
5118	3/3	/NA				GALLEY DC POWER BUS A SWITCH
5119	3/3	/NA				GALLEY DC POWER BUS A SWITCH
5120	3/3	/NA				FOOD OVEN TELEMETRY
5121	3/3	/NA				GALLEY FAN CIRCUIT BREAKERS
5122	3/3	/NA				GALLEY OVEN FAN SWITCH
5123	3/3	/NA				GALLEY OVEN FAN SWITCH
5124	3/3	/NA				OVEN FAN - MOTOR
5125	3/3	/NA				OVEN FAN - MOTOR
5126	3/3	/NA				OVEN FAN - MOTOR
5127	3/3	/NA				OVEN FAN
5128	3/3	/NA				OVEN THERMOSTAT
5129	3/3	/NA				OVEN THERMOSTAT
5130	3/3	/NA				OVEN HEATER
5131	3/3	3/3				OVEN DOOR LNCH/ENTRY RESTRAINT
5132	3/3	/NA				OVEN DOOR
5133	3/3	/NA				OVEN DOOR
5134	3/3	/NA				OVEN DOOR LATCH
5135	3/3	/NA				OVEN DOOR LATCH
5136	3/3	/NA				OVEN DOOR TRACK
5137	3/3	/NA				OVEN DOOR TRACK
5138	3/3	/NA				OVEN GASKET
5139	3/3	/NA				OVEN SHELF ASM - UPPER RA
5140	3/3	/NA				LOWER SHELF ASSEMBLY
5141	3/3	/NA				LOWER TRACKS
5142	3/3	/NA				OVEN SCREEN

(\*) Potential Critical Items.

FOOD ASSEMBLIES ANALYSIS WORKSHEETS SUMMARY

MDAC-ID	CRITICALITY REDUNDANCY			ITEM NAME
	FLIGHT H/F	ABORT H/F	SCREENS A B C	
5143	3/3	/NA		OVEN SCREEN
5144	3/3	/NA		SPRING LOADED PLATE
5145	3/3	/NA		OVEN SPRING CLIP
5146	3/3	/NA		OVEN FINNED PLATE HEAT SINK
5147	3/3	/NA		GALLEY CONTROL ELECTRONICS
5148	3/3	/NA		WATER QUANTITY SELECTOR SWITCH
5149	3/3	/NA		WATER QUANTITY SELECTOR SWITCH
5150	3/3	/NA		WATER QUANTITY SELECTOR SWITCH
5151	3/3	/NA		REHYDRATION PUMP
5152	3/3	/NA		REHYDRATION PUMP
5153	3/3	/NA		RHS LEVER ARM CONTROL
5154	3/3	/NA		RHS LEVER ARM CONTROL
5155	3/3	/NA		REHYDRATION STATION SWITCH
5156	3/3	/NA		REHYDRATION STATION SWITCH
5157	3/3	/NA		COLD WATER FILL PUSH BUTTON SW
5158	3/3	/NA		COLD WATER FILL PUSH BUTTON SW
5159	3/3	/NA		COLD WATER FILL SWITCH - LIGHT
5160	3/3	/NA		COLD WATER FILL SWITCH - LIGHT
5161	3/3	/NA		RHS CHILLED H2O FEED SOLENOID
5162	3/3	/NA		RHS CHILLED H2O FEED SOLENOID
5163	3/3	/NA		RHS OUTLET SOLENOID VALVE
5164	3/3	/NA		RHS OUTLET SOLENOID VALVE
5165	3/3	/NA		RHS BYPASS SOLENOID VALVE
5166	3/3	/NA		RHS BYPASS SOLENOID VALVE
5167	3/3	/NA		HOT WATER FILL PUSH BUTTON SW
5168	3/3	/NA		HOT WATER FILL PUSH BUTTON SW
5169	3/3	/NA		HOT WATER FILL SWITCH - LIGHT
5170	3/3	/NA		HOT WATER FILL SWITCH - LIGHT
5171	3/3	/NA		COLD H2O RECIRCULATION SOLENOID
5172	3/3	/NA		COLD H2O RECIRCULATION SOLENOID
5173	3/3	/NA		RHS NEEDLE
5174	3/3	/NA		RHS CUP RETAINER
5175	3/3	/NA		RHS CUP RETAINER PARALLEL RODS
5176	3/3	/NA		RHS CUP RETAINER PARALLEL RODS
5177	3/3	/NA		RHS "TRANSPARENT CHAMBER"
5178	3/3	/NA		INLET WATER CONNECTIONS
5179	3/2R	/NA	P P P	INLET WATER CONNECTIONS
5180	3/2R	/NA	P P P	MANUAL SHUT OFF VALVE
5181	3/3	/NA		AUXILIARY PORT - POTABLE WATER
5300	3/2R	/NA	P P P	OWDA QD
5301	3/2R	/NA	P P P	OWDA QD
5302	3/2R	/NA	P P P	OWDA AM

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(\*) Potential Critical Items.

**FOOD ASSEMBLIES ANALYSIS WORKSHEETS SUMMARY**

MDAC-ID	CRITICALITY REDUNDANCY			ITEM NAME
	FLIGHT	ABORT	SCREENS	
	H/F	H/F	A B C	
5303	3/2R	/NA	P P P	OWDA AMB/CHILL/OFF VLV
5304	3/2R	/NA	P P P	OWDA AMB/CHILL/OFF VLV
5305	3/2R	/NA	P P P	OWDA PRES REGU.
5306	3/2R	/NA	P P P	OWDA PRES REGU.
5307	3/2R	/NA	P P P	OWDA BYPASS VALVE
5308	3/2R	/NA	P P P	OWDA BYPASS VALVE
5309	3/2R	/NA	P P P	OWDA SOLEN VLV
5310	3/2R	/NA	P P P	OWDA SOLEN VLV
5311	3/2R	/NA	P P P	OWDA ROTARY SEL SW
5312	3/2R	/NA	P P P	OWDA REHYDR. NEEDLE
5313	3/3	/NA		OWDA MICRO. CK. VLV.
5314	3/3	/NA		OWDA MICRO. CK. VLV.
5315	3/2R	/NA	P P P	OWDA MICRO. CK. VLV.
5316	3/3	/NA		OWDA PERS HYG VLV
5317	3/3	/NA		OWDA PERS HYG VLV
5318	3/3	/NA		OWDA PERS HYG VLV
5319	3/3	/NA		OWDA HDLG CLPS
5320	3/3	/NA		OWDA POWER CON
5321	3/2R	/NA	P P P	OWDA FLEX LINE
5322	3/2R	/NA	P P P	OWDA FLEX LINE
5400	3/2R	/NA	P P P	CONTINGENCY WATER DISPENSER
5401	3/2R	/NA	P P P	CONTINGENCY WATER DISPENSER
5402	3/3	/NA		CONTINGENCY WATER DISPENSER

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(\*) Potential Critical Items.

ORBITER HARDWARE ANALYSIS WORKSHEETS SUMMARY

MDAC-ID	CRITICALITY		REDUNDANCY			ITEM NAME
	FLIGHT H/F	ABORT H/F	SCREENS A B C			
6100	3/3	/NA				SLEEPING BAG-ADJUSTABLE STRAP
6101	3/3	/NA				SLEEPING BAG-HELICAL SPRING
6102	3/3	/NA				SLEEPING BAG-CLOTH TUNNEL
6103	3/3	/NA				SLEEPING BAG-SPRING CLIP
6104	3/3	/NA				SLEEPING BAG-SPRING CLIP
6105	3/3	/NA				SLEEPING BAG-PIP PIN
6106	3/3	/NA				SLEEPING BAG-MOUNTING LOCATION
6107	3/3	/NA				SLPG. BAG RSTRNTS. BUCKLE FLAP
6108	3/3	/NA				ATTACHMENT ZIPPER(S)
6109	3/3	/NA				CLOSURE ZIPPER
6110	3/3	/NA				BODY RESTRAINTS
6111	3/3	/NA				4-TIER SLEEP STATION SLDG DOOR
6112	3/3	/NA				4-TIER SLEEP STATION WING NUT
6113	3/3	/NA				4-TIER SLEEP STATION AIR DIFF.
6114	3/3	/NA				4-TIER SLEEP STATION LIGHT
6200	3/1R	/NA	P P P			ORB. SIDE HATCH SAFETY LOCK
6201	3/1R	/NA	P P P			ORB. SIDE HATCH SAFETY LOCK
6300	3/1R	/NA	P P P			MIDDECK STOWAGE LOCKER DOOR
6301	3/3	/NA				MIDDECK STOWAGE LOCKER DOOR
6302	3/3	/NA				MIDDECK STOWAGE LOCKER DOOR
6303	3/1R	3/1R	P P P			MIDDECK STOWAGE LOCKER DOOR
6400	3/3	/NA				TREADMILL EXERCISER ASSEMBLY
6401	3/3	/NA				TREADMILL EXERCISER ASSEMBLY
6402	3/3	/NA				TREADMILL EXERCISER ASSEMBLY
6403	3/3	/NA				TREADMILL EXERCISER ASSEMBLY
6404	3/3	/NA				TREADMILL EXERCISER ASSEMBLY
6405	3/3	/NA				TREADMILL EXERCISER ASSEMBLY
6406	3/3	/NA				TREADMILL EXERCISER ASSEMBLY
6407	3/3	/NA				TREADMILL EXERCISER ASSEMBLY
6408	3/1R	3/1R	P P P			TREADMILL EXERCISER ASSEMBLY
6500	3/3	/NA				COAS INTENSITY CONTROL
6501	3/3	/NA				COAS INTENSITY CONTROL
6502	3/3	/NA				COAS LIGHT BULB
6503	3/3	/NA				COAS MOUNTING BASE
6504	3/3	/NA				COAS FORWARD ADAPTER BRACKET
6505	3/3	/NA				COAS FORWARD ADAPTER BRACKET
6506	3/3	/NA				COAS AFT ADAPTER BRACKET
6507	3/3	/NA				COAS FORWARD MOUNTING BRACKET
6508	3/3	/NA				COAS APERTURE STOP
6509	3/3	/NA				COAS APERTURE STOP
6510	3/3	/NA				COAS COMBINER LENS ASMBLY.
6511	3/3	/NA				COAS BARREL LOCK

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(\*) Potential Critical Items.

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/01/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 1100

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: EVA SCISSORS - SPRING  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA SCISSORS
- 3) SPRING
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AIRLOCK  
PART NUMBER: 10159-20001-02

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

SPRING BREAKS. ONE PAIR OF SCISSORS FLOWN FOR EACH PRIME EMU.  
SCISSORS CAN STILL FUNCTION WITH BROKEN SPRING. OTHER REDUNDANT  
EVA/IVA HARDWARE ITEMS AVAILABLE TO ACCOMPLISH SAME TASK.

REFERENCES: JSC-20466, EVA PREP/POST 2102 TRAINING BOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1101 ABORT: /NA

ITEM: EVA SCISSORS - BLADE  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA SCISSORS
- 3) BLADE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AIRLOCK  
PART NUMBER: 10159-20001-02

CAUSES: MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

BLADE BREAKS. ONE PAIR OF SCISSORS FLOWN FOR EACH PRIME EMU.  
OTHER EVA/IVA REDUNDANT HARDWARE ITEMS AVAILABLE TO ACCOMPLISH  
THE SAME TASK.

REFERENCES: JSC-20466, EVA PREP/POST 2102 TRAINING BOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/01/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 1102

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/2R  
ABORT: /NA

ITEM: EVA SCISSORS - BLADES  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA SCISSORS
- 3) BLADES
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ]      B [ P ]      C [ P ]

LOCATION: AIRLOCK

PART NUMBER: 10159-20001-02

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, OVERLOAD, THERMAL SHOCK

EFFECTS/RATIONALE:

BLADES HAVE TROUBLE CLOSING. ONE PAIR OF SCISSORS FLOWN FOR EACH PRIME EMU. OTHER EVA/IVA REDUNDANT HARDWARE ITEMS AVAILABLE TO ACCOMPLISH THE SAME TASK.

REFERENCES: JSC-20466, EVA PREP/POST 2102 TRAINING BOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 1103 ABORT: /NA

ITEM: EVA SCISSORS LOCKING BAR  
FAILURE MODE: FAILS TO REMAIN CLOSED

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA SCISSORS
- 3) LOCKING BAR
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: AIRLOCK  
PART NUMBER: 10159-20001-02

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

LOCKING BAR BREAKS. ONE PAIR OF SCISSORS FLOWN FOR EACH PRIME EMU. WORST CASE: EVA SCISSORS CANNOT BE STOWED AFTER USE.

REFERENCES: JSC-20466, EVA PREP/POST 2102 TRAINING BOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/01/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 1104

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/2R  
ABORT: /NA

ITEM: EVA SCISSORS HINGE PIN  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA SCISSORS
- 3) HINGE PINS
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: AIRLOCK

PART NUMBER: 10159-20001-02

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

HINGE PIN JOINING BLADES BREAKS. ONE PAIR OF SCISSORS FLOWN FOR EACH EMU. OTHER EVA/IVA REDUNDANT HARDWARE ITEMS AVAILABLE TO ACCOMPLISH SAME TASK.

REFERENCES: JSC-20466, EVA PREP/POST 2102 TRAINING BOOK

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/15/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 1200 ABORT: /NA

ITEM: EMU LIGHT ASSEMBLY - SEQUENCING CIRCUIT BATTERY  
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EMU LIGHT ASSEMBLY
- 3) SEQUENCER CIRCUIT
- 4) BATTERY
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: BATTERY FOR 10161-60029

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, THERMAL SHOCK,  
VIBRATION

EFFECTS/RATIONALE:

THE SEQUENCER CIRCUIT FOR THE EMU LIGHT ASSEMBLY IS POWERED BY ITS OWN WATCH SIZE BATTERY. FAILURE OF THIS BATTERY CAUSES A FAILURE OF THE SEQUENCER CIRCUIT AND HENCE A FAILURE OF THE LIGHT ASSEMBLY ON THE AFFECTED SIDE. THE CREWMEMBER WILL STILL HAVE THE LIGHTS ON THE OPPOSITE SIDE OF THE ASSEMBLY.

REFERENCES: 10161-10061, 10161-60029

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/15/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 1201

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: EMU LIGHT ASSEMBLY - SEQUENCING CIRCUIT THERMOSTAT  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: S.K. SINCLAIR      SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EMU LIGHT ASSEMBLY
- 3) SEQUENCER CIRCUIT
- 4) THERMOSTAT
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ]      B [ ]      C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: THERMOSTAT FOR 10161-60029

CAUSES: CONTAMINATION, OVERLOAD, VIBRATION

EFFECTS/RATIONALE:

THE SEQUENCING CIRCUIT CONTROLS THE LIGHT SELECTION FOR THE EMU LIGHT ASSEMBLY. THE THERMOSTAT PROTECTS AGAINST CASES WHERE TWO LIGHTS ARE LEFT ON FOR PERIODS OF TIME LONGER THAN THE DESIGN LIMITS. THE LIGHTS CAN STILL BE TURNED OFF BY THE SWITCH.

REFERENCES: 10161-10061, 10161-60029

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/15/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 1202 ABORT: /NA

ITEM: EMU LIGHT ASSEMBLY - SEQUENCING CIRCUIT THERMOSTAT  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EMU LIGHT ASSEMBLY
- 3) SEQUENCER CIRCUIT
- 4) THERMOSTAT
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: THERMOSTAT FOR 10161-60029

CAUSES: CONTAMINATION, OVERLOAD, VIBRATION

EFFECTS/RATIONALE:

A FAILURE OF THE THERMOSTAT IN AN OPEN CONFIGURATION MEANS THE SEQUENCING CIRCUIT WILL NO LONGER OPERATE. THE LIGHTS ON THE UNAFFECTED SIDE OF THE ASSEMBLY WILL STILL BE AVAILABLE TO THE EVA CREWMEMBER.

REFERENCES: 10161-10061, 10161-60029

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/15/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 1203

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: EMU LIGHT ASSEMBLY - SEQUENCING CIRCUIT SWITCH  
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: S.K. SINCLAIR      SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EMU LIGHT ASSEMBLY
- 3) SEQUENCER CIRCUIT
- 4) SWITCH
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ]      B [ ]      C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SWITCH FOR 10161-60029

CAUSES: CONTAMINATION, OVERLOAD

EFFECTS/RATIONALE:

THE SEQUENCING CIRCUIT SWITCH ALLOWS THE EVA CREWMEMBER TO SELECT WHICH LIGHTS ARE LIT ON EACH SIDE OF THE HELMET. FAILURE OF THE SWITCH MEANS THAT INCORRECT LIGHTS ARE LIT OR THAT NO LIGHTS ARE LIT. THE OPPOSITE SIDE LIGHTS WILL STILL BE AVAILABLE TO THE EVA CREWMEMBER.

REFERENCES: 10161-10061, 10161-60029

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/15/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 1204 ABORT: /NA

ITEM: EMU LIGHT ASSEMBLY - SEQUENCING CIRCUIT  
FAILURE MODE: FAILS TO OPERATE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EMU LIGHT ASSEMBLY
- 3) SEQUENCER CIRCUIT
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10161-60029

CAUSES: MECHANICAL SHOCK, THERMAL SHOCK, VIBRATION

EFFECTS/RATIONALE:

TOTAL FAILURE OF THE SEQUENCER CIRCUIT MEANS THE EMU LIGHTS ON ONE SIDE OF THE HELMET ARE NO LONGER AVAILABLE TO THE EVA CREWMEMBER. THE LIGHTS ON THE OPPOSITE SIDE ARE STILL AVAILABLE AS ARE ALTERNATE SOURCES OF LIGHTING. IF THE SWITCH FAILS SUCH BOTH LIGHTS ARE ON, THEN THE THERMOSTAT WILL PROTECT AGAINST POSSIBLE THERMAL OVERLOAD.

REFERENCES: 10161-10061, 10161-60029

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/15/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 1205 ABORT: /NA

ITEM: EMU LIGHT ASSEMBLY - BULB  
FAILURE MODE: BURNS OUT

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EMU LIGHT ASSEMBLY
- 3) BULB
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: BULBS FOR 10161-10061

CAUSES: OVERLOAD

EFFECTS/RATIONALE:

A FAILURE OF ONE EMU LIGHT ASSEMBLY BULB STILL LEAVES THREE BULBS ON THE ASSEMBLY AS OPERATIONAL, AS WELL AS ADDITIONAL SOURCES OF LIGHTING.

REFERENCES: 10161-10061

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/15/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 1206 ABORT: /NA

ITEM: EMU LIGHT ASSEMBLY-GIMBAL  
FAILURE MODE: PHYSICAL BINDING

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EMU LIGHT ASSEMBLY
- 3) GIMBAL
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10161-20033

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE

EFFECTS/RATIONALE:

FAILURE OF THE GIMBAL ASSEMBLY MEANS THAT THE EMU LIGHTS ON ONE SIDE OF THE HELMET WILL BE FROZEN IN ONE CONFIGURATION. THE LIGHTS ON THE OPPOSITE SIDE OF THE HELMET WILL STILL BE POSITIONABLE.

REFERENCES: 10161-10061, 10161-20033

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/15/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 1207

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: EMU LIGHT ASSEMBLY-GIMBAL  
FAILURE MODE: ERRATIC OPERATION

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EMU LIGHT ASSEMBLY
- 3) GIMBAL
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: 10161-20033

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE

EFFECTS/RATIONALE:

FAILURE OF THE GIMBAL IN A "FREE" POSITION MEANS THAT THE EMU LIGHTS ON THE AFFECTED SIDE OF THE HELMET CANNOT BE POSITIONED AS DESIRED. THE LIGHTS ON THE AFFECTED SIDE CAN STILL BE POSITIONED.

REFERENCES: 10161-10061, 10161-20033

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/15/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 1208 ABORT: /NA

ITEM: EMU LIGHT ASSEMBLY-GIMBAL  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EMU LIGHT ASSEMBLY
- 3) GIMBAL
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10161-20033

CAUSES: MECHANICAL SHOCK, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

A STRUCTURAL FAILURE OF THE GIMBAL MEANS THAT PART OF THE EMU LIGHT ASSEMBLY (THE PART WITH THE BULBS) WILL NO LONGER BE ATTACHED TO THE REST OF ASSEMBLY. THE FAILURE COULD EXPOSE WIRES THAT NORMALLY RUN FROM THE BULBS TO THE BATTERY. THE COMPLETE ASSEMBLY WOULD BE UNUSABLE AFTER SUCH A FAILURE.

REFERENCES: 10161-10061, 10161-20033

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/15/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 1209

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: EMU LIGHT ASSEMBLY-HELMET LATCH  
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: S.K. SINCLAIR      SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EMU LIGHT ASSEMBLY
- 3) HELMET LATCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ]      B [ ]      C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10161-10061

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

FAILURE OF THE HELMET LATCH TO CLOSE MEANS THE EMU LIGHT ASSEMBLY CANNOT BE ATTACHED TO THE HELMET. THE FLIGHT SPECIFIC GROUNDRULES STATE THAT THE EMU LIGHTS ARE NOT MANDATORY EVA ITEMS.

REFERENCES: 10161-10061

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/15/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 1210 ABORT: /NA

ITEM: EMU LIGHT ASSEMBLY-HELMET LATCH  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EMU LIGHT ASSEMBLY
- 3) HELMET LATCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW COMPARTMENT  
PART NUMBER: 10161-10061

CAUSES: CONTAMINATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:

FAILURE OF THE HELMET LATCH TO OPEN MEANS THE EMU LIGHT ASSEMBLY CANNOT BE RELEASED FROM THE HELMET. CURRENT RULES CALL FOR THE LIGHTS TO BE REMOVED DURING ENTRY FOR CRASH LOAD RESTRICTIONS. THERE IS NO AFFECT ON CREW SAFETY OR MISSION DURATION.

REFERENCES: 10161-10061

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/15/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 1211 ABORT: /NA

ITEM: EMU LIGHT ASSEMBLY-CROSS MEMBER  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EMU LIGHT ASSEMBLY
- 3) CROSS MEMBER
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: 10161-10061

CAUSES: MECHANICAL SHOCK, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

A STRUCTURAL FAILURE OF THE EMU LIGHT ASSEMBLY CROSS MEMBER MEANS THE LIGHT ASSEMBLY CANNOT BE ATTACHED TO THE HELMET. ALTERNATE SOURCES OF LIGHTING ARE STILL AVAILABLE.

REFERENCES: 10161-10061

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/15/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 1212 ABORT: /NA

ITEM: EMU LIGHT ASSEMBLY-BATTERY  
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EMU LIGHT ASSEMBLY
- 3) BATTERY
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10161-20001

CAUSES: ELECTRICAL DISCHARGE

EFFECTS/RATIONALE:

IF THE EMU LIGHT ASSEMBLY BATTERY FAILS, THEN POWER WILL NO LONGER BE AVAILABLE TO THE LIGHTS ON ONE SIDE OF THE ASSEMBLY. SPARE BATTERIES ARE CARRIED ON BOARD AND THE FAILED BATTERY CAN BE CHANGED AT THE END OF THE EVA.

REFERENCES: 10161-10061, 10161-20001

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/15/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 1213 ABORT: /NA

ITEM: EMU LIGHT ASSEMBLY BATTERY-INTERNAL FUSE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EMU LIGHT ASSEMBLY
- 3) BATTERY
- 4) INTERNAL FUSE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: 10161-20001

CAUSES: MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

IF THE INTERNAL FUSE IN THE BATTERY OPENS, THEN THE BATTERY WILL NO LONGER BE OPERATIONAL AND THE LIGHTS ON THE AFFECTED SIDE WILL FAIL OFF. SPARE BATTERIES ARE CARRIED ON BOARD AND THE FAILED BATTERY WILL BE CHANGED AT THE COMPLETION OF THE EVA.

REFERENCES: 10161-10061, 10161-20001

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/15/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 1214 ABORT: /NA

ITEM: EMU LIGHT ASSEMBLY - BATTERY CONTACTS  
FAILURE MODE: ERRATIC OPERATION

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EMU LIGHT ASSEMBLY
- 3) BATTERY CONTACTS
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10161-10061

CAUSES: CONTAMINATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:

ERRATIC OPERATION FROM THE BATTERY CONTACTS MEAN THE EMU LIGHTS MAY BE FLICKERING ON/OFF. WORST CASE WOULD BE SUFFICIENT CONTAMINATION SUCH THAT THE LIGHTS FAIL COMPLETELY OFF.

REFERENCES: 10161-10061, 10161-20001

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/17/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 1300

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/2R  
ABORT: /NA

ITEM: OBS - SIGNAL CONDITIONER  
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: S.K. SINCLAIR      SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL BIOINSTRUMENTATION SYSTEM
- 3) SIGNAL CONDITIONER
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ]      B [ NA ]      C [ P ]

LOCATION: CREW COMPARTMENT

PART NUMBER: TBD

CAUSES: ELECTROMAGNETIC FIELDS

EFFECTS/RATIONALE:

ERRONEOUS OUTPUT FROM THE OBS SIGNAL CONDITIONER MEANS THAT INCORRECT DATA WILL BE RECEIVED AND RECORDED. A SECOND OBS IS FLOWN IN THE EMERGENCY MEDICAL LOCKER.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/17/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1301 ABORT: /NA

ITEM: OBS - SIGNAL CONDITIONER - BATTERY  
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL BIOINSTRUMENTATION SYSTEM
- 3) SIGNAL CONDITIONER
- 4) BATTERY
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: CREW COMPARTMENT  
PART NUMBER:

CAUSES: OVERLOAD, ELECTRICAL DISCHARGE

EFFECTS/RATIONALE:

IF THE BATTERY OF THE OBS SIGNAL CONDITIONER FAILS, THE SIGNAL CONDITIONER AND HENCE THE OBS WILL NO LONGER BE OPERATIONAL.  
SPARE BATTERIES AND A SECOND OBS ARE FLOWN.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/17/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 1302

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/2R  
ABORT: /NA

ITEM: OBS - SIGNAL CONDITIONER - ON/OFF SWITCH  
FAILURE MODE: FAILS TO SWITCH

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL BIOINSTRUMENTATION SYSTEM
- 3) SIGNAL CONDITIONER
- 4) ON/OFF SWITCH
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: CREW COMPARTMENT

PART NUMBER:

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:

THE ON/OFF SWITCH IS BUILT INTO THE OBS AND IS AUTOMATICALLY ACTIVATED WHEN THE IVA BIOMED CABLE IS ATTACHED. A FAILURE SUCH THAT THE SWITCH FAILS IN THE ON POSITION MEANS THE IVA CABLE CANNOT BE ATTACHED. A FAILURE OF THE SWITCH IN THE OFF POSITION MEANS THE SIGNAL CONDITIONER IS NO LONGER OPERATIONAL AND SHOULD BE EXCHANGED FOR THE SPARE SIGNAL CONDITIONER OR THE SPARE OBS.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1303 ABORT: /NA

ITEM: OBS - SIGNAL CONDITIONER - GAIN  
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL BIOINSTRUMENTATION SYSTEM
- 3) SIGNAL CONDITIONER
- 4) VARIABLE GAIN
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: CREW COMPARTMENT  
PART NUMBER:

CAUSES: MECHANICAL SHOCK, VIBRATION

EFFECTS/RATIONALE:

THE VARIABLE GAIN FUNCTION IS PRE-SET BEFORE LAUNCH. AN EXTERNAL FORCE WHICH CAUSES THE GAIN TO BE CHANGED WILL RESULT IN INCORRECT LEVELS BEING REFLECTED IN THE OUTPUT.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1304 ABORT: /NA

ITEM: OBS - SIGNAL CONDITIONER - INPUT PORT  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL BIOINSTRUMENTATION SYSTEM
- 3) SIGNAL CONDITIONER
- 4) INPUT PORT
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: CREW COMPARTMENT

PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

THE INPUT PORT OF THE SIGNAL CONDITIONER IS THE CONNECTION POINT FOR THE ELECTRODE HARNESS. A DESTRUCTION OF ONE OR MORE PINS OR A DISRUPTION OF THE PIN CONFIGURATION WOULD PREVENT THE HARNESS FROM BEING CONNECTED TO THE SIGNAL CONDITIONER AND HENCE THE OBS FROM SERVICING ITS FUNCTION. A SECOND OBS IS CARRIED IN THE MEDICAL LOCKER.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1305 ABORT: /NA

ITEM: OBS - SIGNAL CONDITIONER - OUTPUT PORT  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL BIOINSTRUMENTATION SYSTEM
- 3) SIGNAL CONDITIONER
- 4) OUTPUT PORT
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: CREW COMPARTMENT  
PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

THE OUTPUT PORT OF THE OBS SIGNAL CONDITIONER IS THE CONNECTION POINT FOR EITHER THE IVA OR EVA BIOMED CABLES. A DESTRUCTION OF ONE OR MORE PINS OR A DISRUPTION OF THE PIN CONFIGURATION MEANS THE BIOMED CABLES CANNOT BE ATTACHED AND THE OBS CANNOT PERFORM ITS PRIMARY FUNCTION. A SECOND OBS IS CARRIED IN THE MEDICAL LOCKER.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 1306

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/2R  
ABORT: /NA

ITEM: OBS - SIGNAL CONDITIONER - ESP  
FAILURE MODE: ERRATIC OPERATION

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL BIOINSTRUMENTATION SYSTEM
- 3) SIGNAL CONDITIONER
- 4) ELECTRO SHOCK PROTECTION SYSTEM
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: CREW COMPARTMENT

PART NUMBER:

CAUSES: ELECTROMAGNETIC FIELDS, VIBRATION

EFFECTS/RATIONALE:

THE ELECTRO SHOCK PROTECTION CIRCUIT IS A PART OF THE OBS SIGNAL CONDITIONER CIRCUITRY. FAILURE OF THE CIRCUIT WILL MEAN A FAILURE OF THE SIGNAL CONDITIONER AND HENCE A FAILURE OF THE OBS. A SECOND OBS IS CARRIED IN THE MEDICAL LOCKER.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 1307 ABORT: /NA

ITEM: OBS - BIOMED BELT  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL BIOINSTRUMENTATION SYSTEM
- 3) BIOMED BELT
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW COMPARTMENT  
PART NUMBER:

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:

FAILURE OF THE BIOMED BELT WILL HAVE NO AFFECT ON FUTURE OPERATIONS. ALTERNATE ARRANGEMENTS CAN BE MADE OR CREW INGENUITY CAN COMPENSATE FOR THE FAILED BIOMED BELT.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1308 ABORT: /NA

ITEM: OBS - ELECTRODE HARNESS WIRES  
FAILURE MODE: BROKEN WIRE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL BIOINSTRUMENTATION SYSTEM
- 3) ELECTRODE HARNESS
- 4) WIRES
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: CREW COMPARTMENT

PART NUMBER:

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

A FAILURE WITHIN THE ELECTRODE HARNESS WIRING MEANS THE OBS WILL NO LONGER BE CAPABLE OF PERFORMING ITS PRIMARY FUNCTION. A SECOND OBS IS CARRIED IN THE MEDICAL LOCKER.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1309 ABORT: /NA

ITEM: OBS - ELECTRODES  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL BIOINSTRUMENTATION SYSTEM
- 3) ELECTRODE HARNESS
- 4) ELECTRODES
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: CREW COMPARTMENT

PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

A FAILURE OF THE ELECTRODES, EITHER FROM THE WIRE CONNECTION POINT, OR AT THE ATTACH MECHANISM WILL MEAN A COMPLETE FAILURE OF THE OBS. A SECOND OBS IS CARRIED IN THE MEDICAL LOCKER.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1310 ABORT: /NA

ITEM: OBS - ELECTRODE HARNESS  
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL BIOINSTRUMENTATION SYSTEM
- 3) ELECTRODE HARNESS
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: CREW COMPARTMENT  
PART NUMBER:

CAUSES: SHORTED

EFFECTS/RATIONALE:

A FAILURE WITHIN THE ELECTRODE HARNESS WHICH CAUSES A LOSS OF OUTPUT WILL MEAN THE OBS IS NO LONGER OPERATIONAL. A SECOND OBS IS CARRIED IN THE MEDICAL LOCKER.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 1311

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/2R  
ABORT: /NA

ITEM: OBS - ELECTRODE HARNESS - PIN CONNECTOR/PINS  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR      SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL BIOINSTRUMENTATION SYSTEM
- 3) ELECTRODE HARNESS
- 4) PIN CONNECTOR
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ]      B [ NA ]      C [ P ]

LOCATION: CREW COMPARTMENT

PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

THE ELECTRODE HARNESS PIN CONNECTOR IS THE MEANS BY WHICH THE HARNESS IS CONNECTED TO THE OBS SIGNAL CONDITIONER. A DESTRUCTION OF THE PINS OR A DISTORTION OF THE PIN CONFIGURATION MEANS THE SIGNAL WILL NOT GET TO THE SIGNAL CONDITIONER AND THE OBS IS NOT OPERATIONAL. A SECOND OBS IS CARRIED IN THE MEDICAL LOCKER.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 1312

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: OBS - EVA BIOMED CABLE  
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL BIOINSTRUMENTATION SYSTEM
- 3) EVA BIOMED CABLE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW COMPARTMENT

PART NUMBER:

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

A FAILURE OF THE EVA BIOMED CABLE MEANS THE OBS WILL BE NON-OPERATIONAL. DURING EVA, THE OBS IS DETERMINED TO BE A NON-MANDATORY REQUIREMENT AND THEREFORE, LOSS OF THE EVA BIOMED CABLE WILL NOT MEAN THE TERMINATION OF A MISSION.

REFERENCES: JSC-12770, SED42100961

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 1313 ABORT: /NA

ITEM: OBS - EVA BIOMED CABLE - PINS/PIN CONNECTOR  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL BIOINSTRUMENTATION SYSTEM
- 3) EVA BIOMED CABLE
- 4) PINS
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW COMPARTMENT  
PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

A DESTRUCTION OF THE PINS OR A DISTORTION OF THE PIN CONFIGURATION AT EITHER END OF THE EVA BIOMED CABLE MEANS THE CABLE WILL NOT WORK. THE OBS IS NOT A MANDATORY REQUIREMENT DURING EVA OPERATIONS.

REFERENCES: JSC-12770, SED42100961

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1314 ABORT: /NA

ITEM: OBS - IVA BIOMED CABLE  
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL BIOINSTRUMENTATION SYSTEM
- 3) IVA BIOMED CABLE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: CREW COMPARTMENT  
PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE,  
LOSS OF INPUT

EFFECTS/RATIONALE:

A FAILURE OF THE IVA BIOMED CABLE MEANS THE SIGNAL WILL NO LONGER GET FROM THE SIGNAL CONDITIONER TO THE ORBITER BIOMED CABLE. A SECOND OBS AND IVA BIOMED CABLE ARE CARRIED IN THE MEDICAL LOCKER.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1315 ABORT: /NA

ITEM: OBS - IVA BIOMED CABLE - PINS/PIN CONNECTOR  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL BIOINSTRUMENTATION SYSTEM
- 3) IVA BIOMED CABLE
- 4) PINS
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: CREW COMPARTMENT

PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

A DESTRUCTION OF THE PINS OR A DISTORTION OF THE PIN CONFIGURATION AT EITHER END OF THE IVA BIOMED CABLE MEANS THE CABLE WILL NO LONGER WORK. A SECOND OBS AND IVA BIOMED CABLE ARE CARRIED IN THE MEDICAL LOCKER.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1316 ABORT: /NA

ITEM: BIOMED CHANNEL SWITCH  
FAILURE MODE: MECHANICALLY JAMS IN ONE POSITION

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL BIOINSTRUMENTATION SYSTEM
- 3) BIOMED CHANNEL SWITCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: PANEL R10

PART NUMBER:

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE

EFFECTS/RATIONALE:

A MECHANICAL JAM OF ONE OF THE BIOMED CHANNEL SWITCHES IN A SINGLE POSITION MEANS THAT THE OBS IS ONLY OPERATIONAL WHEN IT IS HOOKED TO THAT POSITION. THERE IS A SECOND BIOMED CHANNEL SWITCH WHICH IS AVAILABLE FOR SELECTING THE REMAINING OBS INTERFACE LOCATIONS.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 1317 ABORT: /NA

ITEM: BIOMED CHANNEL SWITCH  
FAILURE MODE: ONE POSITION PERMANENTLY SELECTED

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL BIOINSTRUMENTATION SYSTEM
- 3) BIOMED CHANNEL SWITCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL R10

PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

CONTAMINATION CAUSES ONE POSITION ON THE BIOMED CHANNEL SWITCH TO BE PERMANENTLY SELECTED. THIS CAUSES NO PERCEIVABLE PROBLEM SINCE THE SELECTION OF ONE POSITION DOES NOT PRECLUDE THE USE OF THE REMAINING SWITCH POSITIONS.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 1318

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/2R  
ABORT: /NA

ITEM: BIOMED PANEL CABLE  
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL BIOINSTRUMENTATION SYSTEM
- 3) BIOMED PANEL CABLE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: PANEL R10

PART NUMBER:

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, ELECTROMAGNETIC FIELDS

EFFECTS/RATIONALE:

THE BIOMED PANEL CABLE GOES BETWEEN THE IVA BIOMED CABLE AND THE BIOMED INTERFACE PANELS. A LOSS OF OUTPUT FROM THIS CABLE MEANS THE OBS WILL BE CONSIDERED NON-OPERATIONAL. ADDITIONAL PANEL CABLES ARE AVAILABLE FOR USE.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1319 ABORT: /NA

ITEM: BIOMED PANEL CABLE - PINS/PIN CONNECTOR  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL BIOINSTRUMENTATION SYSTEM
- 3) BIOMED PANEL CABLE
- 4) PINS
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: PANEL R10

PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

A DESTRUCTION OF THE PINS OR A DISTORTION OF THE PIN CONFIGURATION AT EITHER END OF THE BIOMED PANEL CABLE MEANS THE CABLE WILL BE NO LONGER OPERATIONAL. SPARE CABLES ARE CARRIED ONBOARD.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/20/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1320 ABORT: /NA

ITEM: BIOMED PANEL CABLE - SHUTTLE INTERFACES  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL BIOINSTRUMENTATION SYSTEM
- 3) BIOMED PANEL CABLE
- 4) SHUTTLE INTERFACES
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: PANELS A15, A11, M062M

PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

THE SHUTTLE INTERFACES PROVIDE THE PLACES WHERE THE BIOMED PANEL CABLE IS PLUGGED INTO. FAILURE OF THESE INTERFACES MEANS THE OBS DATA WILL NOT REACH THE DOWNLINK. THIS, IN TURN, MEANS THE OBS MUST BE CONSIDERED NON-OPERATIONAL. MORE THAN ONE "PLUG-IN" SLOT IS AVAILABLE.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1400 ABORT: /NA

ITEM: PORTABLE FOOT RESTRAINT PLATFORM ASSEMBLY  
ADJUSTMENT KNOB  
FAILURE MODE: FAILS TO TIGHTEN/LOOSEN

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PORTABLE FOOT RESTRAINT
- 3) PLATFORM ASSEMBLY
- 4) ADJUSTMENT KNOB
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10159-10034-02

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

KNOB FAILS TO TIGHTEN/LOOSEN DUE TO: 1) BROKEN KNOB, 2) STRIPPED THREADS, OR 3) CONTAMINATED THREADS. IF PLATFORM CANNOT BE ADJUSTED, THE CREWMEMBER MAY EXPERIENCE DIFFICULTY IN PERFORMING EVA TASK, WHICH COULD ULTIMATELY MEAN AN OMITTED OR INCOMPLETE EVA TASK. THE SECOND PFR COULD BE USED AS REQUIRED.

REFERENCES: JSC-20466, 10159-10034

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1401 ABORT: /NA

ITEM: PORTABLE FOOT RESTRAINT PLATFORM ASSEMBLY LOCKING PLATES  
FAILURE MODE: LOCKING PLATES SLIP

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PORTABLE FOOT RESTRAINT
- 3) PLATFORM ASSEMBLY
- 4) LOCKING PLATES
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10159-10034-02

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

THE LOCKING PLATES MAY SLIP BECAUSE THE SERRATIONS ARE CONTAMINATED OR GALLED. FAILURE OF THE LOCKING PLATES TO HOLD MEANS THAT THE PLATFORM CANNOT BE ADJUSTED. A CREWMEMBER MAY EXPERIENCE DIFFICULTY IN PERFORMING EVA TASK, WHICH COULD RESULT IN EVA TASK BEING OMITTED OR NOT COMPLETED. THE SECOND PFR COULD BE USED AS REQUIRED.

REFERENCES: JSC-20466, 10159-10034

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 1402 ABORT: /NA

ITEM: PORTABLE FOOT RESTRAINT PLATFORM ASSEMBLY TOE BAR  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PORTABLE FOOT RESTRAINT
- 3) PLATFORM ASSEMBLY
- 4) TOE BAR
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10159-10034-02

CAUSES: STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE OF A TOE BAR REDUCES THE CREWMEMBER'S CONSTRAINTS. THE CREWMEMBER CAN STILL PERFORM TASKS, BUT NOT AS EFFECTIVELY.

REFERENCES: JSC-20466, 10159-10034

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1403 ABORT: /NA

ITEM: PORTABLE FOOT RESTRAINT PLATFORM ASSEMBLY HEEL  
LOCK

FAILURE MODE: FAILS TO HOLD BOOT HEEL

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PORTABLE FOOT RESTRAINT
- 3) PLATFORM ASSEMBLY
- 4) HEEL LOCK
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY

PART NUMBER: 10159-10034-02

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

CREWMEMBER MAY NOT BE ABLE TO PERFORM EVA TASK AS EFFICIENTLY.  
THE HEEL LOCK MAY BE REPAIRED OR THE SECOND PFR MAY BE USED.

REFERENCES: JSC-20466, 10159-10034

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1404 ABORT: /NA

ITEM: PORTABLE FOOT RESTRAINT PLATFORM ASSEMBLY HEEL  
LOCK  
FAILURE MODE: FAILS TO RELEASE BOOT HEEL

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PORTABLE FOOT RESTRAINT
- 3) PLATFORM ASSEMBLY
- 4) HEEL LOCK
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10159-10034-02

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

CREWMEMBER FREES BOOT FROM PFR PLATFORM EITHER WITH TOOLS OR WITH HELP FROM OTHER CREWMEMBER.

REFERENCES: JSC-20466, 10159-10034

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1410 ABORT: /NA

ITEM: PORTABLE FOOT RESTRAINT TELESCOPING BOOM ASSEMBLY  
INBOARD CLAMP  
FAILURE MODE: FAILS TO TIGHTEN/LOOSEN

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PORTABLE FOOT RESTRAINT
- 3) TELESCOPING BOOM ASSEMBLY
- 4) INBOARD CLAMP
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10155-20003-01

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

KNOB FAILS TO TIGHTEN/LOOSEN DUE TO: 1) BROKEN KNOB, 2) STRIPPED THREADS, OR 3) CONTAMINATED THREADS. CREWMEMBER WILL BE UNABLE TO ATTACH OR REMOVE BOOM ASSEMBLY FROM BULKHEAD HANDRAILS.

REFERENCES: JSC-20466, 10155-20003

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/09/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1411 ABORT: /NA

ITEM: PORTABLE FOOT RESTRAINT TELESCOPING BOOM ASSEMBLY  
OUTBOARD CLAMP  
FAILURE MODE: FAILS TO TIGHTEN/LOOSEN

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PORTABLE FOOT RESTRAINT
- 3) TELESCOPING BOOM ASSEMBLY
- 4) OUTBOARD CLAMP
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10155-20003-01

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

KNOB FAILS TO TIGHTEN/LOOSEN DUE TO: 1) BROKEN KNOB, 2) STRIPPED THREADS, OR 3) CONTAMINATED THREADS. CREWMEMBER WILL BE UNABLE TO ATTACH OR REMOVE BOOM ASSEMBLY FROM BULKHEAD HANDRAILS.

REFERENCES: JSC-20466, 10155-20003

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1412 ABORT: /NA

ITEM: PORTABLE FOOT RESTRAINT TELESCOPING BOOM ASSEMBLY  
PLATFORM CLAMP  
FAILURE MODE: FAILS TO TIGHTEN/LOOSEN

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PORTABLE FOOT RESTRAINT
- 3) TELESCOPING BOOM ASSEMBLY
- 4) PLATFORM CLAMP
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10155-20003-01

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

CLAMPS FAILS TO TIGHTEN/LOOSEN DUE TO: 1) BROKEN KNOB, 2)  
STRIPPED THREADS, OR 3) CONTAMINATED THREADS. THE CLAMP CANNOT  
BE MOVED OR SECURED TO THE BOOM ASSEMBLY.

REFERENCES: JSC-20466, 10155-20003

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1413 ABORT: /NA

ITEM: PORTABLE FOOT RESTRAINT TELESCOPING BOOM ASSEMBLY  
PLATFORM CLAMP  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PORTABLE FOOT RESTRAINT
- 3) TELESCOPING BOOM ASSEMBLY
- 4) PLATFORM CLAMP
- 5) EYE BOLT
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10155-20003-01

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:

FAILURE OF THE EYE BOLT ALLOWS THE PLATFORM ASSEMBLY TO SEPARATE FROM THE BOOM ASSEMBLY. OTHER CLAMPS OR THE OTHER PFR COULD BE USED AS NEEDED.

REFERENCES: JSC-20466, 10155-20003

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1414 ABORT: /NA

ITEM: PORTABLE FOOT RESTRAINT TELESCOPING BOOM ASSEMBLY  
QUICK RELEASE PIN  
FAILURE MODE: CANNOT INSERT PIN

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PORTABLE FOOT RESTRAINT
- 3) TELESCOPING BOOM ASSEMBLY
- 4) QUICK RELEASE PIN
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10155-20003-01

CAUSES: CONTAMINATION, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

QUICK RELEASE PIN CANNOT BE INSERTED TO ATTACH THE PLATFORM ASSEMBLY AND THE BOOM ASSEMBLY. OTHER CLAMPS OR THE OTHER PFR COULD BE USED AS NEEDED.

REFERENCES: JSC-20466, 10155-20003

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1415 ABORT: /NA

ITEM: PORTABLE FOOT RESTRAINT TELESCOPING BOOM ASSEMBLY  
QUICK RELEASE PIN  
FAILURE MODE: CANNOT REMOVE PIN

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PORTABLE FOOT RESTRAINT
- 3) TELESCOPING BOOM ASSEMBLY
- 4) QUICK RELEASE PIN
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10155-20003-01

CAUSES: CONTAMINATION, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

QUICK RELEASE PIN CANNOT BE REMOVED. PLATFORM ASSEMBLY CANNOT BE DETACHED FROM THE BOOM ASSEMBLY.

REFERENCES: JSC-20466, 10155-20003

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1416 ABORT: /NA

ITEM: PORTABLE FOOT RESTRAINT TELESCOPING BOOM ASSEMBLY  
INNER AND OUTER TUBES  
FAILURE MODE: CANNOT EXTEND/RETRACT TUBES

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PORTABLE FOOT RESTRAINT
- 3) TELESCOPING BOOM ASSEMBLY
- 4) INNER AND OUTER TUBES
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10155-20003-01

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

IF THE BOOM DOES NOT TELESCOPE, I.E. THE TUBES DO NOT EXTEND OR RETRACT, THE PLATFORM CANNOT BE POSITIONED AS REQUIRED. OTHER CLAMPS OR THE OTHER PFR MAY BE USED.

REFERENCES: JSC-20466, 10155-20003

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1417 ABORT: /NA

ITEM: PORTABLE FOOT RESTRAINT TELESCOPING BOOM ASSEMBLY  
TORQUE LIMITER  
FAILURE MODE: UNDER LIMITS TORQUE

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PORTABLE FOOT RESTRAINT
- 3) TELESCOPING BOOM ASSEMBLY
- 4) TORQUE LIMITER
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10155-20003-01

CAUSES: MISHANDLING/ABUSE, MISADJUSTMENT

EFFECTS/RATIONALE:

THE TORQUE LIMITER PREVENTS THE BOOM ASSEMBLY BEING SECURED IN PLACE. THE PLATFORM ASSEMBLY WILL NOT REMAIN AS POSITIONED. OTHER CLAMPS OR THE SECOND PFR ARE AVAILABLE.

REFERENCES: JSC-20466, 10155-20003

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1418 ABORT: /NA

ITEM: PORTABLE FOOT RESTRAINT TELESCOPING BOOM ASSEMBLY  
TORQUE LIMITER  
FAILURE MODE: OVER LIMITS TORQUE

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PORTABLE FOOT RESTRAINT
- 3) TELESCOPING BOOM ASSEMBLY
- 4) TORQUE LIMITER
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10155-20003-01

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, MISADJUSTMENT

EFFECTS/RATIONALE:

TORQUE LIMITER PERMITS EXCESSIVE TORQUE. HANDRAILS OR BULKHEAD COULD BE DAMAGED. OTHER CLAMPS OR THE SECOND PFR ARE AVAILABLE.

REFERENCES: JSC-20466, 10155-20003

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1420 ABORT: /NA

ITEM: PORTABLE FOOT RESTRAINT CENTERLINE CLAMP ASSEMBLY  
QUICK RELEASE PIN  
FAILURE MODE: CANNOT INSERT PIN

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PORTABLE FOOT RESTRAINT
- 3) CENTERLINE CLAMP ASSEMBLY
- 4) QUICK RELEASE PIN
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10155-20004-04

CAUSES: CONTAMINATION, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

PLATFORM ASSEMBLY CANNOT BE SECURED IN THE CENTERLINE CLAMP.  
OTHER CLAMPS OR THE OTHER PFR ARE AVAILABLE.

REFERENCES: JSC-20466, 10155-20004

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1421 ABORT: /NA

ITEM: PORTABLE FOOT RESTRAINT CENTERLINE CLAMP ASSEMBLY  
QUICK RELEASE PIN  
FAILURE MODE: CANNOT REMOVE PIN

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PORTABLE FOOT RESTRAINT
- 3) CENTERLINE CLAMP ASSEMBLY
- 4) QUICK RELEASE PIN
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10155-20004-04

CAUSES: CONTAMINATION, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

QUICK RELEASE PIN CANNOT BE REMOVED. PLATFORM ASSEMBLY CANNOT BE DETACHED FROM THE CENTERLINE CLAMP.

REFERENCES: JSC-20466, 10155-20004

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 1422 ABORT: /NA

ITEM: PORTABLE FOOT RESTRAINT CENTERLINE CLAMP ASSEMBLY  
ALIGNMENT TABS  
FAILURE MODE: MISADJUSTMENT

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PORTABLE FOOT RESTRAINT
- 3) CENTERLINE CLAMP ASSEMBLY
- 4) ALIGNMENT TABS
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10155-20004-04

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

ALIGNMENT TABS FAIL TO ALIGN CENTERLINE CLAMP ONTO CENTERLINE LATCH SUCH THAT CAPTURE JAWS ARE NOT POSITIONED FOR FASTENING.  
ALIGNMENT MAY BE PERFORMED VISUALLY.

REFERENCES: JSC-20466, 10155-20004

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/13/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1423 ABORT: /NA

ITEM: PORTABLE FOOT RESTRAINT CENTERLINE CLAMP ASSEMBLY  
CAPTURE JAWS  
FAILURE MODE: FAILS TO REMAIN CLOSED

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PORTABLE FOOT RESTRAINT
- 3) CENTERLINE CLAMP ASSEMBLY
- 4) CAPTURE JAWS
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10155-20004-04

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

PLATFORM ASSEMBLY COULD SLIP OR SEPARATE FROM THE CENTERLINE CLAMP. OTHER CLAMPS AND THE SECOND PFR ARE AVAILABLE.

REFERENCES: JSC-20466, 10155-20004

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/13/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1424 ABORT: /NA

ITEM: PORTABLE FOOT RESTRAINT CENTERLINE CLAMP ASSEMBLY  
CLAMP KNOB  
FAILURE MODE: FAILS TO TIGHTEN/LOOSEN

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PORTABLE FOOT RESTRAINT
- 3) CENTERLINE CLAMP ASSEMBLY
- 4) CLAMP KNOB
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10155-20004-04

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

KNOB FAILS TO TIGHTEN/LOOSEN DUE TO: 1) BROKEN KNOB, 2) STRIPPED THREADS, OR 3) CONTAMINATED THREADS. UNABLE TO ATTACH/REMOVE THE CENTERLINE CLAMP FROM THE CENTERLINE LATCH.

REFERENCES: JSC-20466, 10155-20004

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/13/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1430 ABORT: /NA

ITEM: PORTABLE FOOT RESTRAINT ARTICULATING SOCKET  
ASSEMBLY ADJUSTMENT KNOB  
FAILURE MODE: FAILS TO TIGHTEN/LOOSEN

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PORTABLE FOOT RESTRAINT
- 3) ARTICULATING SOCKET ASSEMBLY
- 4) ADJUSTMENT KNOB
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10159-10035

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

KNOB FAILS TO TIGHTEN/LOOSEN DUE TO: 1) BROKEN KNOB, 2) STRIPPED THREADS, 3) CONTAMINATED THREADS. THE SOCKET ASSEMBLY NOT ADJUSTED AND THE PLATFORM ASSEMBLY NOT POSITIONED AS REQUIRED.

REFERENCES: JSC-20466, 10155-10035

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/13/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1431 ABORT: /NA

ITEM: PORTABLE FOOT RESTRAINT ARTICULATING SOCKET  
ASSEMBLY LOCKING PLATES  
FAILURE MODE: LOCKING PLATES SLIP

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PORTABLE FOOT RESTRAINT
- 3) ARTICULATING SOCKET ASSEMBLY
- 4) LOCKING PLATES
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10159-10035

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:  
SOCKET ASSEMBLY CANNOT BE SECURED IN THE DESIRED POSITION.

REFERENCES: JSC-20466, 10155-10035

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/13/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 1432 ABORT: /NA

ITEM: PORTABLE FOOT RESTRAINT ARTICULATING SOCKET  
ASSEMBLY QUICK RELEASE PIN  
FAILURE MODE: CANNOT INSERT PIN

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PORTABLE FOOT RESTRAINT
- 3) ARTICULATING SOCKET ASSEMBLY
- 4) QUICK RELEASE PIN
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10159-10035

CAUSES: CONTAMINATION, MISHANDLING/ABUSE

EFFECTS/RATIONALE:  
PLATFORM ASSEMBLY CANNOT BE ATTACHED TO THE SOCKET ASSEMBLY.

REFERENCES: JSC-20466, 10155-10035

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 2100 ABORT: /NA

ITEM: EVA SLIDEWIRE ASSEMBLY-SLIDE  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA SLIDEWIRE
- 3) SLIDE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CARGO BAY  
PART NUMBER: V617-544722

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

THE SLIDE IS THE PART TO WHICH THE EVA TETHER HOOK IS ATTACHED. IF THE SLIDE PHYSICALLY JAMS IN ONE SPOT THEN THE EVA CREWMAN'S MOBILITY AROUND THE PAYLOAD BAY IS AFFECTED. THIS WOULD RESULT IN THE LOSS OF A PLANNED EVA REQUIRING THE USE OF THE SLIDEWIRE. A CONTINGENCY EVA, SUCH AS CLOSING PAYLOAD DOORS, WOULD BE PERFORMED USING ALTERNATE MEANS OF TETHER.

REFERENCES: V617-544720, M072-544700

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 2101 ABORT: /NA

ITEM: EVA SLIDEWIRE ASSEMBLY-SLIDE  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA SLIDEWIRE
- 3) SLIDE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	1/1	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: V617-544702

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

A STRUCTURAL FAILURE OF THE SLIDE WHILE AN EVA CREWMAN IS TETHERED IN PLACE WILL RESULT IN THE CREWMAN FLOATING FREE. THE CREWMAN CAN BE "CAPTURED" USING THE ORBITER/ALTERNATE EVA CREWMAN.

REFERENCES: V617-544720, M072-544700

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 2102 ABORT: /NA

ITEM: EVA SLIDEWIRE ASSEMBLY-SLIDE  
FAILURE MODE: STRUCTURAL FAILURE-CRIMPED

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA SLIDEWIRE ASSEMBLY
- 3) SLIDE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ NA ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: V617-544702

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

A CRIMP IN THE EVA SLIDEWIRE SLIDE WILL RESULT IN THE EVA CREWMAN NOT BEING ABLE TO USE IT AS A TETHER SPOT. THERE ARE ADDITIONAL SLIDES ON BOTH SIDES OF THE ORBITER WHICH CAN BE USED AS BACKUP. IF NONE OF THE SLIDES WERE AVAILABLE, THEN ANY PLANNED EVA WOULD BE CANCELLED. CONTINGENCY EVAS COULD STILL BE PERFORMED USING ALTERNATE MEANS OF TETHER.

REFERENCES: V617-544720, M072-544700

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/2  
MDAC ID: 2103 ABORT: /NA

ITEM: EVA SLIDEWIRE ASSEMBLY-STOP  
FAILURE MODE: BREAKS FREE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA SLIDEWIRE ASSEMBLY
- 3) STOP
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/2	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: V617-544723

CAUSES: MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

THIS FAILURE ALLOWS THE STOP/SLIDE COMBINATION TO STRIKE THE SLIDEWIRE END ASSEMBLIES PLUS ALLOW THE SLIDES TO TRAVEL FURTHER THAN DESIGNED. IT IS UNLIKELY THAT SUFFICIENT FORCE WILL BE GENERATED TO PULL THE ROPE FROM THE END FITTINGS. HOWEVER, THE WHIP END COULD BE DAMAGED AND FURTHER EVA ACTIVITIES CURTAILED.

REFERENCES: V617-544720

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 2104 ABORT: /NA

ITEM: EVA SLIDEWIRE-END FITTINGS  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA SLIDEWIRE
- 3) END FITTING
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: V617-544721

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

A STRUCTURAL FAILURE OF THE SLIDEWIRE END FITTING WILL RESULT IN THE SLIDEWIRE BEING FREE AT ONE END. THE SLIDES, WITH THE EVA TETHERS ATTACHED, ARE STILL RESTRAINED BY THE STOPS. THEREFORE, THE FIRST FAILURE SHOULD BE A LOSS OF MISSION. THE LOSS OF ALL UNLIKE REDUNDANCY INCLUDING THE STOPS CAN RESULT IN AN UNRESTRAINED EVA CREWMAN.

REFERENCES: V617-544720, M072-544700

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 2105 ABORT: /NA

ITEM: EVA SLIDEWIRE ASSEMBLY-COTTER PIN  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA SLIDEWIRE
- 3) COTTER PIN
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY

PART NUMBER: MS24665-153

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:

THE COTTER PIN, IN ADDITION TO THE CHEMICAL ADHESIVE, ANCHORS THE KEVLAR ROPE ON THE END FITTING. A FAILURE OF THE COTTER PIN REMOVES ONE LEVEL OF REDUNDANCY IN THE ANCHORING SYSTEM.

REFERENCES: M072-544700

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/1R  
MDAC ID: 2106 ABORT: /NA

ITEM: EVA SLIDEWIRE ASSEMBLY - QUICK DISCONNECT PIN  
FAILURE MODE: COMES OUT

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA SLIDEWIRE
- 3) SUPPORT STRUCTURE ASSEMBLY
- 4) QUICK DISCONNECT PIN
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: ME122-0014-5098

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, VIBRATION

EFFECTS/RATIONALE:

THE LOSS OF THE QUICK DISCONNECT PIN IN THE EVA SLIDEWIRE MEANS UNEXPECTED AND UNANTICIPATED LOADING ON THE REMAINDER OF THE SUPPORT STRUCTURE DURING AN EVA. WORST CASE WOULD RESULT IN THE SUPPORT STRUCTURE CONTACTING THE RADIATOR AND POSSIBLE DEFORMATION OF THE PAYLOAD BAY DOOR.

REFERENCES: M072-544700

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 2107 ABORT: /NA

ITEM: EVA SLIDEWIRE ASSEMBLY - QUICK DISCONNECT PIN  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA SLIDEWIRE
- 3) SUPPORT STRUCTURE ASSEMBLY
- 4) QUICK DISCONNECT PIN
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: ME122-0014-5098

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

THE QUICK DISCONNECT PIN APPEARS TO BE USED WHEN THE MECHANISM "JAMS" AND A RELEASE MECHANISM IS REQUIRED. FAILURE OF THE PIN TO RELEASE MEANS THE JAM CANNOT BE CLEARED. THIS PREVENTS THE PAYLOAD BAY DOOR FROM CLOSING. THE PROBLEM CAN BE SOLVED BY REMOVING A BOLT FROM ANOTHER LOCATION IN THE SUPPORT STRUCTURE OR USING THE HACKSAW.

REFERENCES: M072-544700

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 2108 ABORT: /NA

ITEM: EVA SLIDEWIRE ASSEMBLY-SUPPORT STRUCTURE  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA SLIDEWIRE
- 3) SUPPORT STRUCTURE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY

PART NUMBER: VARIOUS PIECES INCLUDING V617-544701; V617-544702;  
V617-544704; V617-544705

CAUSES: MECHANICAL SHOCK, OVERLOAD, PIECE-PART FAILURE,  
VIBRATION

EFFECTS/RATIONALE:

A FAILURE OF ANY PIECE OF THE SLIDEWIRE SUPPORT STRUCTURE MEANS A LOSS OF EVA CAPABILITY ON THE AFFECTED SIDE OF THE PAYLOAD. IT ALSO OPENS THE POSSIBILITY FOR THE DAMAGED STRUCTURE TO CONTACT THE RADIATOR AND/OR CAUSE DEFORMATION OF THE PAYLOAD BAY DOOR.

REFERENCES: M072-544700

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 2109 ABORT: /NA

ITEM: EVA SLIDEWIRE  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA SLIDEWIRE ASSEMBLY
- 3) SLIDEWIRE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	1/1	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: V617-544720

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

IF THE SLIDEWIRE BREAKS WHILE IN USE, THE EVA CREWMAN WILL NO LONGER BE RESTRAINED. THIS WILL REQUIRE ORBITER MANEUVERS TO "CAPTURE" AND RETRIEVE THE CREWMAN.

REFERENCES: M072-544700

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 2200 ABORT: /NA

ITEM: EXTENDED RANGE CREWMEMBER SAFETY TETHER-SMALL HOOK  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) ERCM TETHER
- 3) SMALL HOOK
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	1/1	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: ST201-11009

CAUSES: MECHANICAL SHOCK, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

A STRUCTURAL FAILURE OF THE SMALL HOOK WILL RESULT IN AN UNRESTRAINED EVA CREWMEMBER.

REFERENCES: 10162-10062

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 2201 ABORT: /NA

ITEM: EXTENDED RANGE CREWMEMBER SAFETY TETHER-SMALL HOOK  
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) ERCM SAFETY TETHER
- 3) SMALL HOOK
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: ST201-11009

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

FAILURE OF THE TETHER HOOK MEANS THAT THE ERCM SAFETY TETHER CANNOT BE USED. THERE ARE NO SAFETY IMPLICATIONS SINCE THE TETHER IS NOT IN USE WHEN THE FAILURE OCCURS. CREW ACTIONS CAN DEVISE ALTERNATE MEANS OF RESTRAINT IN THE EVENT OF A FAILURE OF THIS TYPE.

REFERENCES: 10162-10062

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 2202

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: EXTENDED RANGE CREWMEMBER SAFETY TETHER-SMALL HOOK  
FAILURE MODE: FAILS CLOSED

LEAD ANALYST: S.K. SINCLAIR

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) ERCM SAFETY TETHER
- 3) SMALL HOOK
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ]      B [ ]      C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: ST201-11009

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

FAILURE OF THE HOOK IN A CLOSED POSITION WILL MEAN THE TETHER CANNOT BE USED TO RESTRAIN EVA CREWMEN (IF THE TETHER IS NOT IN USE WHEN THE FAILURE OCCURS). IF THE TETHER IS ATTACHED TO THE SLIDE WHEN THE HOOK FAILS CLOSED, IT CANNOT BE RELEASED. CREW ACTIONS CAN PREVENT ANY FURTHER PROBLEMS.

REFERENCES: 10162-10062

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 2203 ABORT: /NA

ITEM: EXTENDED RANGE CREWMEMBER SAFETY TETHER-CABLE  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) ERCM SAFETY TETHER
- 3) CABLE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	1/1	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: 10162-20037

CAUSES: MECHANICAL SHOCK, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

A STRUCTURAL FAILURE OF THE CABLE WILL MEAN AN UNRESTRAINED,  
FREE-FLOATING EVA CREWMEMBER.

REFERENCES: 10162-10062

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 2204 ABORT: /NA

ITEM: ERCM SAFETY TETHER-CABLE ATTACH POINTS  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) ERCM SAFETY TETHER
- 3) CABLE
- 4) ATTACHMENTS
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	1/1	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10162-10062

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

A STRUCTURAL FAILURE OF THE CABLE ATTACH POINTS AT EITHER THE HOOK OR THE REEL ASSEMBLY MEANS A BROKEN CABLE AND AN UNRESTRAINED EVA CREWMEMBER.

REFERENCES: 10162-10062

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 2205 ABORT: /NA

ITEM: EXTENDED RANGE CREWMEMBER SAFETY TETHER-REEL CASE  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) ERCM SAFETY TETHER
- 3) REEL CASE HOUSING
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	1/1	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: 10162-20021; 10162-20022

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

A STRUCTURAL FAILURE OF THE CABLE TAKE UP REEL HOUSING WILL ALLOW THE CABLE TO COME FREE (NO LONGER ATTACHED TO THE TAKE UP REEL). THIS MEANS THE EVA CREWMEMBER WILL BE UNRESTRAINED.

REFERENCES: 10162-10062

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 2206 ABORT: /NA

ITEM: ERCM SAFETY TETHER-CABLE TAKE UP ASSEMBLY  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) ERCM SAFETY TETHER
- 3) CABLE TAKE UP ASSEMBLY
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10162-20025

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE,  
PIECE-PART FAILURE

EFFECTS/RATIONALE:

IF THE CABLE TAKE UP ASSEMBLY CEASES TO TURN, THE CABLE LENGTH  
WILL REMAIN AT THE FAILED POSITION. THERE ARE NO SAFETY  
IMPLICATIONS, ONLY REDUCED CREWMEMBER MOBILITY.

REFERENCES: 10162-10062

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 2207

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: ERCM SAFETY TETHER-CABLE TAKE UP ASSEMBLY  
FAILURE MODE: FAILS "UNLOCKED"

LEAD ANALYST: S.K. SINCLAIR      SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) ERCM SAFETY TETHER
- 3) CABLE TAKE UP ASSEMBLY
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ]      B [ ]      C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10162-20025

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

A FAILURE WITHIN THE CABLE TAKE UP ASSEMBLY SUCH THAT THE TAKE-UP REEL CANNOT BE RESTRAINED MEANS THAT THE CABLE CANNOT BE STOPPED AT A GIVEN LENGTH. THE "UNLOCKED" CONDITION STILL ALLOWS THE TETHER TO REEL OUT AND RETRACT AS REQUIRED.

REFERENCES: 10162-10062

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 2208 ABORT: /NA

ITEM: ERCM SAFETY TETHER-CABLE TAKE UP ASSEMBLY  
FAILURE MODE: INADVERTENT RELEASE OF BRAKE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) ERCM SAFETY TETHER
- 3) CABLE TAKE UP ASSEMBLY
- 4) BRAKE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10162-20025

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE

EFFECTS/RATIONALE:

AN INADVERTENT RELEASE OF THE TAKE UP REEL BRAKE WHILE THE TETHER IS IN USE MEANS THAT THE CABLE WILL EXTEND/RETRACT UNEXPECTEDLY. THIS SHOULD NOT CAUSE ANY PROBLEM.

REFERENCES: 10162-10062

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 2209 ABORT: /NA

ITEM: ERCM SAFETY TETHER-CABLE TAKE UP ASSEMBLY  
FAILURE MODE: INADVERTENT OPERATION OF BRAKE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) ERCM SAFETY TETHER
- 3) CABLE TAKE UP ASSEMBLY
- 4) BRAKE
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10162-20025

CAUSES: MECHANICAL SHOCK

EFFECTS/RATIONALE:  
INADVERTENT OPERATION OF THE BRAKE MEANS THE CABLE WILL SUDDENLY  
BE RESTRAINED. NO SAFETY IMPLICATIONS.

REFERENCES: 10162-10062

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 2210 ABORT: /NA

ITEM: ERCM SAFETY TETHER-LOCK/UNLOCK SELECTOR SWITCH  
FAILURE MODE: PHYSICAL BINDING/JAMMING IN LOCK POSITION

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) ERCM SAFETY TETHER
- 3) LOCK/UNLOCK SELECTOR SWITCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: 10151-20034; 10151-20038

CAUSES: CONTAMINATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:

FAILING THE SELECTOR SWITCH IN THE LOCK POSITION WILL RESULT IN THE CABLE BEING STUCK AT ONE LENGTH. THIS MEANS REDUCED MOBILITY FOR THE EVA CREWMEMBER BUT NO SAFETY IMPLICATIONS.

REFERENCES: 10162-10062

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 2211

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: ERCM SAFETY TETHER-LOCK/UNLOCK SELECTOR SWITCH  
FAILURE MODE: PHYSICAL BINDING/JAMMING IN UNLOCK POSITION

LEAD ANALYST: S.K. SINCLAIR

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) ERCM SAFETY TETHER
- 3) LOCK/UNLOCK SELECTOR SWITCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10151-20034; 10151-20038

CAUSES: CONTAMINATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:

FAILURE OF THE SELECTOR SWITCH IN THE UNLOCKED POSITION MEANS THE CABLE WILL RETRACT AND RELEASE WITH THE CREWMAN - IT CANNOT BE LOCKED INTO ONE POSITION. NO SAFETY IMPLICATIONS.

REFERENCES: 10162-10062

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 2212 ABORT: /NA

ITEM: ERCM SAFETY TETHER-"D" RING  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) ERCM SAFETY TETHER
- 3) "D" RING
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	1/1	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10162-10062

CAUSES: OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

A STRUCTURAL FAILURE OF THE INTEGRAL "D" RING WILL RESULT IN AN UNRESTRAINED EVA CREWMEMBER.

REFERENCES: 10162-10062

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 2213

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: ERCM SAFETY TETHER-"D" RING  
FAILURE MODE: CRIMPING OF "D" RING

LEAD ANALYST: S.K. SINCLAIR      SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) ERCM SAFETY TETHER
- 3) "D" RING
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ]      B [ ]      C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: 10162-10062

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

A "CRIMPING" OF THE INTEGRAL "D" RING MEANS THE WAIST TETHER HOOK CANNOT BE CONNECTED. THE TETHER CANNOT THEN PERFORM ITS FUNCTION BUT THERE ARE NO SAFETY IMPLICATIONS.

REFERENCES: 10162-10062

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 2300 ABORT: /NA

ITEM: WAIST TETHER-HOOKS  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) WAIST TETHER
- 3) HOOKS
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	1/1	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: LARGE-ST20H1009-04; SMALL-ST20H1009-01

CAUSES: MECHANICAL SHOCK, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

A FAILURE OF THE HOOK WHILE IN USE WILL RESULT IN AN UNRESTRAINED EVA CREWMEMBER.

REFERENCES: 10151-20040, JSC-20466

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 2301

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: WAIST TETHER-HOOKS  
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: S.K. SINCLAIR      SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) WAIST TETHER
- 3) HOOKS
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ]      B [ ]      C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: LARGE-ST20H1009-04; SMALL-ST20H1009-01

CAUSES: CONTAMINATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:

A MECHANICAL JAM OF THE HOOK IN THE OPEN POSITION MEANS THE TETHER IS NO LONGER USABLE. NO SAFETY ISSUES INVOLVED SINCE TETHER IS NOT IN OPERATION AT THE TIME THE FAILURE OCCURS.

REFERENCES: 10151-20040, JSC-20466

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 2302 ABORT: /NA

ITEM: WAIST TETHER-HOOKS  
FAILURE MODE: FAILS CLOSED

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) WAIST TETHER
- 3) HOOKS
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: LARGE-ST20H1009-04; SMALL-ST20H1009-01

CAUSES: CONTAMINATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:

IF THE HOOKS FAIL CLOSED, THE TETHER CAN NO LONGER BE USED (IF NOT YET IN USE) OR BE RELEASED FROM THE EQUIPMENT IF CURRENTLY IN USE. CREW ACTIONS CAN PROVIDE ALTERNATIVE WORK-AROUNDS.

REFERENCES: 10151-20040, JSC-20466

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 2303

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 1/1  
ABORT: /NA

ITEM: WAIST TETHER-HOOKS  
FAILURE MODE: INADVERTENT OPENING

LEAD ANALYST: S.K. SINCLAIR      SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) WAIST TETHER
- 3) HOOKS
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	1/1	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ]      B [ ]      C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: LARGE-ST20H1009-04; SMALL-ST20H1009-01

CAUSES: CONTAMINATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:

AN INADVERTENT OPENING OF EITHER OF THE HOOKS ON THE WAIST TETHER MEANS AN UNRESTRAINED EVA CREWMEMBER.

REFERENCES: 10151-20040, JSC-20466

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 2304 ABORT: /NA

ITEM: WAIST TETHER-NOMEX WEBBING  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) WAIST TETHER
- 3) NOMEX WEBBING
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	1/1	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: ST13N981

CAUSES: OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

A STRUCTURAL FAILURE OF THE NOMEX WEBBING RESULTS IN AN UNRESTRAINED EVA CREWMEMBER.

REFERENCES: 10151-20040, JSC-20466

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 2305

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 1/1  
ABORT: /NA

ITEM: WAIST TETHER-NOMEX WEBBING  
FAILURE MODE: FAILS TO TEARAWAY AS DESIGNED

LEAD ANALYST: S.K. SINCLAIR

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) WAIST TETHER
- 3) NOMEX WEBBING
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	1/1	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: ST13N981

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

THE NOMEX WEBBING IS DESIGNED TO TEAR INTO ADDITIONAL LENGTHS AS EXCESSIVE LOADS ARE APPLIED. IF THIS FEATURE DOES NOT OPERATE CORRECTLY, THEN EXCESSIVE LOADS CAN BE APPLIED TO THE EMU BEFORE ANTICIPATED.

REFERENCES: 10151-20040, JSC-20466

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/08/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 2306 ABORT: /NA

ITEM: WAIST TETHER-NOMEX WEBBING  
FAILURE MODE: TEARS AT ATTACH POINTS

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) WAIST TETHER
- 3) NOMEX WEBBING
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	1/1	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: ST13N981

CAUSES: MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

TEARING OF THE NOMEX WEBBING AT THE ATTACH POINTS TO THE HOOK CAN BE CAUSED BY OVERLOAD, SHARP EDGES ON THE ATTACHMENT, ETC. A COMPLETE TEARING WILL RESULT IN AN UNRESTRAINED EVA CREWMEMBER.

REFERENCES: 10151-20040, JSC-20466

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3100 ABORT: /NA

ITEM: TUBE CUTTER CUTTING WHEEL  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TUBE CUTTER
- 3) CUTTING WHEEL
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY

PART NUMBER: SED33101368

CAUSES: MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

CUTTING WHEEL BREAKS. USED TO CUT DRIVE TUBES ON PLBD.  
REDUNDANT ITEMS ARE IVA HACKSAW AND WIRE SAW. LOSS OF ALL  
REDUNDANCY WILL RESULT IN LOSS OF LIFE AND VEHICLE DUE TO  
INABILITY TO CLOSE DOORS AND DEORBIT.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101368

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3101 ABORT: /NA

ITEM: TUBE CUTTER CUTTING WHEEL  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TUBE CUTTER
- 3) CUTTING WHEEL
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101368

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

CUTTING WHEEL UNABLE TO ROTATE. USED TO CUT DRIVE TUBES ON PLB.  
REDUNDANT ITEMS ARE IVA HACKSAW AND WIRE SAW. LOSS OF ALL  
REDUNDANCY WILL RESULT IN LOSS OF LIFE AND VEHICLE DUE TO  
INABILITY TO CLOSE DOORS AND DEORBIT.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101368

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 3102

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 2/1R  
ABORT: /NA

ITEM: TUBE CUTTER CUTTING WHEEL SLIDE  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TUBE CUTTER
- 3) CUTTING WHEEL SLIDE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ]      B [ P ]      C [ P ]

LOCATION: PAYLOAD BAY

PART NUMBER: SED33101368

CAUSES: CONTAMINATION, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

CUTTING WHEEL SLIDE (CARRYING CUTTING WHEEL) IS UNABLE TO DESCEND WHEN SMALL RATCHET HANDLE IS TRIED. USED TO CUT DRIVE TUBES ON PLBD. IF UNABLE TO CLOSE DOORS THE VEHICLE IS UNABLE TO DEORBIT. LOSS OF ALL REDUNDANCY WILL RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101368

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3103 ABORT: /NA

ITEM: TUBE CUTTER RATCHET WHEEL (ON SMALL RATCHET)  
ASSEMBLY  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TUBE CUTTER
- 3) SMALL RATCHET WHEEL
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101368

CAUSES: CONTAMINATION, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

RATCHET WHEEL IN SMALL SCREW RATCHET ASSEMBLY FAILS TO TURN AND CUTTING WHEEL WILL NOT TOUCH TUBE BEING CUT. USED TO CUT DRIVE TUBES ON PLBD. IF UNABLE TO CLOSE DOORS THE VEHICLE IS UNABLE TO DEORBIT. LOSS OF ALL REDUNDANCY WILL RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101368

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3104 ABORT: /NA

ITEM: TUBE CUTTER SMALL RATCHET ASSEMBLY DIRECTION  
SELECTION TAB  
FAILURE MODE: FAILS TO OPEN/CLOSE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TUBE CUTTER
- 3) DIRECTION SELECTION TAB
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED3101368

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

RATCHET ASSEMBLY DIRECTION SELECTION TAB FAILS. UNABLE TO CHANGE RATCHET DIRECTION. WORST CASE WOULD NOT ALLOW CUTTING WHEEL TO CONTACT TUBE. USED TO CUT DRIVE TUBES ON PLBD. IF UNABLE TO CLOSE DOORS THE VEHICLE IS UNABLE TO DEORBIT. LOSS OF ALL REDUNDANCY WILL RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101368

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3105 ABORT: /NA

ITEM: TUBE CUTTER SMALL RATCHET ASSEMBLY DIRECTION  
SELECTION TAB  
FAILURE MODE: FAILS TO REMAIN OPEN/CLOSE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TUBE CUTTER
- 3) DIRECTION SELECTION TAB
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101368

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

RATCHET ASSEMBLY DIRECTION SELECTION TAB FAILS. UNABLE TO ENGAGE RATCHET WHEEL OR UNABLE TO STAY AT SELECTED RATCHET DIRECTION. WORST CASE WOULD NOT ALLOW CUTTING WHEEL TO CONTACT TUBE. USED TO CUT DRIVE TUBES ON PLBD. IF UNABLE TO CLOSE DOORS THE VEHICLE IS UNABLE TO DEORBIT. LOSS OF ALL REDUNDANCY WILL RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101368

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 3106

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/1R  
ABORT: /NA

ITEM: TUBE CUTTER PAWL  
FAILURE MODE: FAILS TO ENGAGE NOTCHES

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TUBE CUTTER
- 3) PAWL
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101368

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

PAWL FAILS TO ENGAGE NOTCHES. UNABLE TO ROTATE TUBE CUTTER AROUND TUBE. FAILURE OF FIRST AND SECOND PAWL UNDETECTABLE BY CREWMAN. TOOL STILL FUNCTIONS. FAILURE OF ALL 3 PAWLS RESULT IN LOSS OF TOOL FUNCTION. USED TO CUT DRIVE TUBES ON PLBD. IF UNABLE TO CLOSE DOORS THE VEHICLE IS UNABLE TO DEORBIT. LOSS OF ALL REDUNDANCY WILL RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101368

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/1R  
MDAC ID: 3107 ABORT: /NA

ITEM: TUBE CUTTER PAWL  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TUBE CUTTER
- 3) PAWL
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101368

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:

PAWL BREAKS. UNABLE TO ROTATE TUBE CUTTER AROUND TUBE. FAILURE OF FIRST AND SECOND PAWL UNDETECTABLE BY CREWMAN. TOOL STILL FUNCTIONS. FAILURE OF ALL 3 PAWLS RESULTS IN LOSS OF TOOL FUNCTION. USED TO CUT DRIVE TUBES ON PLBD. IF UNABLE TO CLOSE DOORS THE VEHICLE IS UNABLE TO DEORBIT. LOSS OF ALL REDUNDANCY WILL RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101368

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 3108 ABORT: /NA

ITEM: TUBE CUTTER SPRING-ASSISTED RETENTION ROLLER (ON  
ROLLER LINK)  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TUBE CUTTER
- 3) SPRING-ASSISTED RETENTION ROLLER
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101368

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:

RETENTION ROLLER FAILS TO MAINTAIN TENSION ON PIPE BEING CUT.  
MOST PROBABLE CAUSE IS FAILURE OF TORSION SPRING(S) OR DOWEL PIN  
(ON LINK) BEING PUSHED ON BY TORSION SPRINGS. USED TO HOLD PLBD  
DRIVE TUBES DURING CUTTING.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101368

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3109 ABORT: /NA

ITEM: TUBE CUTTER ROLLER LINK  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TUBE CUTTER
- 3) ROLLER LINK
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101368

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

ROLLER LINK STICKS IN "DOWN" POSITION UNABLE TO SPRING "UP" AND AWAY FROM TUBE BEING CUT. USED TO HOLD PLBD DRIVE TUBES DURING CUTTING. IF UNABLE TO CLOSE DOORS THE VEHICLE IS UNABLE TO DEORBIT. LOSS OF ALL REDUNDANCY WILL RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101368

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 3110

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: TUBE CUTTER IDLER ROLLER  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TUBE CUTTER
- 3) IDLER ROLLER
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ]      B [ ]      C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: SED33101368

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

IDLER ROLLER(S) UNABLE TO TURN. LOSS OF IDLER ROLLER WILL NOT CAUSE LOSS OF TOOL FUNCTION. TOOL WILL BE MUCH HARDER TO ROTATE AROUND TUBE BUT SHOULD STILL FUNCTION.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101368

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3111 ABORT: /NA

ITEM: TUBE CUTTER LARGE RATCHET HANDLE  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TUBE CUTTER
- 3) RATCHET HANDLE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101368

CAUSES: MISHANDLING/ABUSE, OVERLOAD, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

HANDLE BREAKS. CREW ACTIONS REDUCE HARDWARE CRITICALITY BY ONE TO A "2". TOOL IS USED TO CUT DRIVE TUBES ON PLBD. IF UNABLE TO CLOSE DOORS THE VEHICLE IS UNABLE TO DEORBIT. LOSS OF ALL REDUNDANCY WILL RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101368

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3112 ABORT: /NA

ITEM: TUBE CUTTER SMALL RATCHET HANDLE  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TUBE CUTTER
- 3) SMALL RATCHET HANDLE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101368

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

SMALL RATCHET HANDLE USED TO SNUG CUTTING WHEEL TO TUBE BREAKS.  
CREW ACTIONS REDUCE HARDWARE CRITICALITY BY ONE TO A "2". TOOL  
IS USED TO CUT DRIVE TUBES ON PLBD. IF UNABLE TO CLOSE DOORS THE  
VEHICLE IS UNABLE TO DEORBIT. LOSS OF ALL REDUNDANCY WILL RESULT  
IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101368

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 3113 ABORT: /NA

ITEM: TUBE CUTTER SOFT-TIP SET SCREW  
FAILURE MODE: FAILS TO CONTACT SHAFT

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TUBE CUTTER
- 3) SOFT-TIP SET SCREW
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101368

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

SOFT TIP SET SCREW USED TO "SNUG-UP" SLIDE DRIVE SHAFT DOES NOT CONTACT SHAFT. SET SCREW PREVENTS BOTH CUTTING WHEEL SLIDE AND DRIVE SHAFT FROM BACK DRIVING DURING CUTTING WHEEL CONTACT. FAILURE OF SET SCREW SHOULD NOT CAUSE LOSS OF TOOL FUNCTION. BACK DRIVING IS NOT NORMALLY A PROBLEM.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101368

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 3200

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: CENTERLINE LATCH BYPASS TOOL SAFETY RELEASE  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: L. GRAHAM

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) CENTERLINE LATCH BYPASS TOOL
- 3) SAFETY RELEASE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101621

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

SAFETY RELEASE IS UNABLE TO MOVE TO ENABLE TRIGGER. TWO TOOLS FLOWN ON EACH FLIGHT. OPERATION OF RATCHET WILL RELEASE LATCH BYPASSING SAFETY RELEASE FAILURE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101621

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 3201 ABORT: /NA

ITEM: CENTERLINE LATCH BYPASS TOOL LATCH  
FAILURE MODE: INADVERTENT OPERATION

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) CENTERLINE LATCH BYPASS TOOL
- 3) LATCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101621

CAUSES: MISHANDLING/ABUSE

EFFECTS/RATIONALE:

LATCH MAY RELEASE DUE TO MISHANDLING BY CREW. TWO TOOLS FLOWN EACH FLIGHT. CREW CAN MANUALLY RESET TOOL IF ACCIDENTLY TRIGGERED OR MANUALLY HOLD TOOL IN STOWED CONFIGURATION UNTIL PLACED IN CORRECT POSITION/ATTITUDE FOR USE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101621

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 3202

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/1R  
ABORT: /NA

ITEM: CENTERLINE LATCH BYPASS TOOL LATCH  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: L. GRAHAM

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) CENTERLINE LATCH BYPASS TOOL
- 3) LATCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	3/1R	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ]      B [ P ]      C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101621

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

LATCH FAILS TO OPEN WHEN RELEASED, THEREFORE THE TOOL WILL FAIL TO CAPTURE THE LATCH ROLLER OF THE PAYLOAD BAY DOOR. TWO TOOLS FLOWN ON EACH FLIGHT. FAILURE OF THE SECOND HARDWARE ITEM WOULD RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101621

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 3203 ABORT: /NA

ITEM: CENTERLINE LATCH BYPASS TOOL LATCH  
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) CENTERLINE LATCH BYPASS TOOL
- 3) LATCH
- 4) PIVOT PIN
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	1/1	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101621

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:

PIVOT PIN (SDD33101625-001 OR SDD33101625-005) FAILS THEREBY BREAKING LATCH. TOOL IS UNABLE TO FUNCTION. LOSS OF VEHICLE OR LIFE POSSIBLE WITH LOSS OF FUNCTION. THERE IS A SECOND TOOL ONBOARD BUT IS NOT REDUNDANT DURING OPERATION.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101621

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 3204

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 1/1  
ABORT: /NA

ITEM: CENTERLINE LATCH BYPASS TOOL RATCHET WHEEL  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) CENTERLINE LATCH BYPASS TOOL
- 3) RATCHET WHEEL
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	1/1	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101621

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

TWO TOOLS FLOWN ON EACH FLIGHT. RATCHET BEING UNABLE TO OPERATE RESULTS IN A TOOL UNABLE TO FUNCTION. LOSS OF VEHICLE POSSIBLE WITH LOSS OF FUNCTION. FAILURE OF FIRST HARDWARE ITEM RESULTS IN LOSS OF LIFE OR VEHICLE SINCE THERE IS NO OPERATIONAL REDUNDANCY FOR THIS TOOL. THIS FAILURE COULD PREVENT USE OF REDUNDANT TOOL.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101621

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 3205 ABORT: /NA

ITEM: CENTERLINE LATCH BYPASS TOOL RELEASE TRIGGER  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) CENTERLINE LATCH BYPASS TOOL
- 3) SAFETY RELEASE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101621

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

RELEASE TRIGGER JAMMED. TWO TOOLS FLOWN ON EACH FLIGHT.  
OPERATION OF RATCHET WILL FORCE RELEASE OF LATCH THEREBY  
BYPASSING FAILURE OF RELEASE TRIGGER.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101621

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 3206

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 1/1  
ABORT: /NA

ITEM: CENTERLINE LATCH BYPASS TOOL RATCHET HANDLE  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) CENTERLINE LATCH BYPASS TOOL
- 3) RATCHET HANDLE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	1/1	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101621

CAUSES: MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

RATCHET HANDLE BREAKS. TWO TOOLS FLOWN ON EACH FLIGHT. ASSUMING TOOL BREAKS WHILE UNDER TENSION AND AT A POINT ALONG SHAFT HANDLE WHERE EVA TOOLS (PLIERS, ETC.) WOULD NOT BE USEFUL. EVA CREWMAN WOULD BE UNABLE TO REVERSE TOOL. SECOND TOOL COULD NOT BE INSTALLED IF FIRST TOOL CANNOT BE REMOVED.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101621

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 3207 ABORT: /NA

ITEM: CENTERLINE LATCH BYPASS TOOL RELEASE CATCH  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) CENTERLINE LATCH BYPASS TOOL
- 3) RELEASE CATCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101628

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:

TWO TOOLS FLOWN ON EACH FLIGHT. IF TOOL RELEASE CATCH BREAKS  
TOOL LATCH WILL RELEASE (DEPLOY). CREW CAN MANUALLY HOLD TOOL IN  
STOWED CONFIGURATION UNTIL PLACED IN CORRECT POSITION/ATTITUDE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101621

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 3208 ABORT: /NA

ITEM: CENTERLINE LATCH BYPASS TOOL SAFETY RELEASE TAB  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) CENTERLINE LATCH BYPASS TOOL
- 3) SAFETY RELEASE TAB
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101621

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:

TWO TOOLS FLOWN ON EACH FLIGHT. WORST CASE WOULD HAVE EVA CREWMAN INADVERTENTLY ACTIVATING LATCH RELEASE. CREWMAN CAN MANUALLY RESET TOOL.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101621

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 3300 ABORT: /NA

ITEM: 3-POINT LATCH TOOL RATCHET HANDLE  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) 3-POINT LATCH TOOL
- 3) RATCHET HANDLE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	1/1	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101327

CAUSES: MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

RATCHET HANDLE BREAKS. TWO TOOLS FLOWN ON EACH FLIGHT. WORST CASE PRECLUDES USE OF EVA TOOLS TO REPAIR/REPLACE HANDLE. NO OPERATIONAL REDUNDANCY FOR THIS TOOL. LOSS OF LATCHING FUNCTION WILL RESULT IN LOSS OF LIFE OR VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101327

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 3301 ABORT: /NA

ITEM: 3-POINT LATCH TOOL HOOK  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) 3-POINT LATCH TOOL
- 3) HOOK
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	1/1	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101327

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:

HOOK BREAKS. TWO TOOLS FLOWN ON EACH FLIGHT. NO OPERATIONAL REDUNDANCY FOR THIS TOOL. WORST CASE PRECLUDES USE OF EVA TOOLS AND PROCEDURES TO REPAIR/REPLACE HOOK. LOSS OF LATCHING FUNCTION WILL RESULT IN LOSS OF LIFE OR VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101327

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 3302 ABORT: /NA

ITEM: 3-POINT LATCH TOOL RATCHET WHEEL SELECTOR TAB  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) 3-POINT LATCH TOOL
- 3) RATCHET WHEEL SELECTOR TAB
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	1/1	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101327

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

RATCHET WHEEL DIRECTION SELECTOR TAB CANNOT CHANGE. TWO TOOLS FLOWN ON EACH FLIGHT. WORST CASE PRECLUDES FUNCTIONING OF TOOL. NO OPERATIONAL REDUNDANCY FOR THIS TOOL. LOSS OF LATCHING FUNCTION RESULTS IN LOSS OF LIFE OR VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101327

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 3303 ABORT: /NA

ITEM: 3-POINT LATCH TOOL RATCHET WHEEL SELECTOR TAB  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) 3-POINT LATCH TOOL
- 3) RATCHET WHEEL SELECTOR TAB
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	1/1	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101327

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

RATCHET WHEEL DIRECTION SELECTOR TAB CANNOT CHANGE. TWO TOOLS FLOWN ON EACH FLIGHT. WORST CASE PRECLUDES FUNCTIONING OF TOOL. NO OPERATIONAL REDUNDANCY FOR THIS TOOL. LOSS OF LATCHING FUNCTION RESULTS IN LOSS OF LIFE OR VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101327

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 3304 ABORT: /NA

ITEM: 3-POINT LATCH TOOL RATCHET WHEEL  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) 3-POINT LATCH TOOL
- 3) RATCHET WHEEL
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	1/1	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101327

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

RATCHET WHEEL IS UNABLE TO ROTATE. TWO TOOLS FLOWN ON EACH FLIGHT. WORST CASE PRECLUDES USE OF EVA TOOLS AND PROCEDURES TO REPAIR/REPLACE GEAR. NO OPERATIONAL REDUNDANCY FOR THIS TOOL. LOSS OF LATCHING FUNCTION WILL RESULT IN LOSS OF LIFE OR VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101327

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 3305 ABORT: /NA

ITEM: 3-POINT LATCH TOOL ROLLER SHOE RELEASE HANDLE  
LATCH  
FAILURE MODE: INADVERTENT OPERATION

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) 3-POINT LATCH TOOL
- 3) ROLLER SHOE RELEASE HANDLE LATCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101327

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

RELEASE HANDLE LATCH FAILS OR CREWMAN ACCIDENTLY RELEASES ROLLER SHOE BY LIFTING LATCH. TWO TOOLS FLOWN ON EACH FLIGHT. CREWMAN CAN MANUALLY RESET TOOL IF LATCH IS INTACT. IF LATCH HAS BROKEN CREWMAN CAN MANUALLY HOLD AND PLACE TOOL TO THE CORRECT POSITION AND ATTITUDE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101327

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 3306 ABORT: /NA

ITEM: 3-POINT LATCH TOOL ROLLER SHOE RELEASE HANDLE  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) 3-POINT LATCH TOOL
- 3) ROLLER SHOE RELEASE HANDLE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	1/1	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101327

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

ROLLER SHOE RELEASE HANDLE(S) FAIL. TWO TOOLS FLOWN ON EACH FLIGHT. WORST CASE WOULD PRECLUDE USE OF EVA TOOLS AND PROCEDURES TO REPAIR/REPLACE. NO OPERATIONAL REDUNDANCY FOR THIS TOOL. LOSS OF FUNCTION RESULTS IN LOSS OF LIFE OR VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101327

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 3307

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 1/1  
ABORT: /NA

ITEM: 3-POINT LATCH TOOL COMPENSATOR ASSEMBLY  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) 3-POINT LATCH TOOL
- 3) COMPENSATOR ASSEMBLY
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	1/1	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101327

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:

TWO TOOLS FLOWN ON EACH FLIGHT. COMPENSATOR ASSEMBLY FAILS. NO OPERATIONAL REDUNDANCY FOR THIS TOOL. LOSS OF LATCHING FUNCTION WILL RESULT IN LOSS OF LIFE OR VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101327

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 3308 ABORT: /NA

ITEM: 3-POINT LATCH TOOL ROLLER SHOE ASSEMBLY  
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) 3-POINT LATCH TOOL
- 3) ROLLER SHOE ASSEMBLY
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	1/1	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: SED33101327

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:

PIVOT PIN FAILS. ROLLER SHOE CANNOT STAY DEPLOYED. NO OPERATIONAL REDUNDANCY AVAILABLE FOR THIS TOOL. LOSS OF FUNCTION RESULTS IN LOSS OF LIFE OR VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101327

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/08/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 3400

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 2/1R  
ABORT: /NA

ITEM: EVA WINCH AND MOUNT ASSEMBLY HOOK  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH AND MOUNT ASSEMBLY
- 3) HOOK
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101570

CAUSES: OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

EVA WINCH HOOK BREAKS. LOSS OF ALL FUNCTIONAL REDUNDANCY OF WINCH WOULD CAUSE LOSS OF VEHICLE DUE TO INABILITY TO CLOSE PLBD OR RESTOW RMS AND DEORBIT.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101570

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/09/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3401 ABORT: /NA

ITEM: EVA WINCH AND MOUNT ASSEMBLY RATCHET HANDLE  
CONTROL LEVER  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH AND MOUNT ASSEMBLY
- 3) RATCHET HANDLE CONTROL LEVER
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101570

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

RATCHET HANDLE CONTROL LEVER BREAKS. LOSS OF ALL FUNCTIONAL REDUNDANCY OF WINCH WOULD CAUSE LOSS OF VEHICLE DUE TO INABILITY TO CLOSE PLB DOORS AND DEORBIT. CREW HANDLE REPAIR CAN REDUCE HARDWARE CRITICALITY BY ONE TO A "2".

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101570

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/09/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 3402

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 2/1R  
ABORT: /NA

ITEM: EVA WINCH AND MOUNT ASSEMBLY RATCHET HANDLE  
CONTROL LEVER  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH AND MOUNT ASSEMBLY
- 3) RATCHET HANDLE CONTROL LEVER
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101570

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

RATCHET HANDLE CONTROL LEVER JAMS/BINDS. LOSS OF ALL FUNCTIONAL REDUNDANCY OF WINCH WOULD CAUSE LOSS OF VEHICLE DUE TO INABILITY TO CLOSE PLB DOOR AND DEORBIT.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101570

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/09/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3403 ABORT: /NA

ITEM: EVA WINCH AND MOUNT ASSEMBLY LARGE CONTROL HANDLE  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH AND MOUNT ASSEMBLY
- 3) LARGE CONTROL HANDLE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101570

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:

LARGE CONTROL HANDLE (REEL SELECTOR) BREAKS. LOSS OF ALL FUNCTIONAL REDUNDANCY OF WINCH WOULD CAUSE LOSS OF VEHICLE DUE TO INABILITY TO CLOSE PLB DOORS AND DEORBIT. CREW HANDLE REPAIR CAN REDUCE HARDWARE CRITICALITY BY ONE TO A "2". FAILURE OF REDUNDANT WINCH COULD RESULT IN LOSS OF LIFE OR VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101570

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/09/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3404 ABORT: /NA

ITEM: EVA WINCH AND MOUNT ASSEMBLY LARGE CONTROL HANDLE  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH AND MOUNT ASSEMBLY
- 3) LARGE CONTROL HANDLE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY

PART NUMBER: SED33101570

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

LARGE CONTROL HANDLE (REEL SELECTOR) JAMS/BINDS. LOSS OF ALL FUNCTIONAL REDUNDANCY WOULD CAUSE LOSS OF VEHICLE DUE TO INABILITY TO CLOSE PLB DOORS AND DEORBIT. CREW HANDLE REPAIR CAN REDUCE HARDWARE CRITICALITY BY ONE TO A "2". FAILURE OF REDUNDANT WINCH COULD RESULT IN LOSS OF LIFE OR VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101570

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/09/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3405 ABORT: /NA

ITEM: EVA WINCH AND MOUNT RATCHET HANDLE  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH AND MOUNT ASSEMBLY
- 3) RATCHET HANDLE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101570

CAUSES: PIECE-PART FAILURE, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

RATCHET HANDLE BREAKS. LOSS OF ALL FUNCTIONAL REDUNDANCY WOULD CAUSE LOSS OF VEHICLE DUE TO INABILITY TO CLOSE PLB DOORS AND DEORBIT. CREW HANDLE REPAIR CAN REDUCE HARDWARE CRITICALITY BY ONE TO A "2". FAILURE OF REDUNDANT WINCH COULD RESULT IN LOSS OF LIFE OR VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101570

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/09/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3406 ABORT: /NA

ITEM: EVA WINCH AND MOUNT ASSEMBLY ROPE  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH AND MOUNT ASSEMBLY
- 3) ROPE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101570

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

ROPE JAMS/BINDS. LOSS OF ALL FUNCTIONAL REDUNDANCY WOULD CAUSE LOSS OF VEHICLE DUE TO INABILITY TO CLOSE PLB DOORS AND DEORBIT. CREW ACTIONS REDUCE HARDWARE CRITICALITY BY ONE TO A "2". FAILURE OF REDUNDANT WINCH COULD RESULT IN LOSS OF LIFE OR VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101570

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	6/09/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	CREW EQUIPMENT	FLIGHT:	2/1R
MDAC ID:	3407	ABORT:	/NA

ITEM: EVA WINCH AND MOUNT ASSEMBLY ROPE  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM                  SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH AND MOUNT ASSEMBLY
- 3) ROPE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ]                  B [ P ]                  C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101570

CAUSES: OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

ROPE BREAKS. LOSS OF ALL FUNCTIONAL REDUNDANCY WOULD CAUSE LOSS OF VEHICLE DUE TO INABILITY TO CLOSE PLB DOORS AND DEORBIT. CREW ACTIONS REDUCE HARDWARE CRITICALITY BY ONE TO A "2". FAILURE OF REDUNDANT WINCH COULD RESULT IN LOSS OF LIFE OR VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101570

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/09/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 3408 ABORT: /NA

ITEM: EVA WINCH AND MOUNT ASSEMBLY TORQUE LIMITER  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH AND MOUNT ASSEMBLY
- 3) TORQUE LIMITER
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: SED33101570

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

TORQUE LIMITER FAILS TO SLIP. LOSS OF TORQUE LIMITER SHOULD NOT PRECLUDE WINCH OPERATION. LIMITER IS USED TO AVOID OVERLOAD CAUSED (MOST PROBABLY) BY OBSTRUCTION.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101570

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/09/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3409 ABORT: /NA

ITEM: EVA WINCH AND MOUNT ASSEMBLY RATCHET WHEEL  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH AND MOUNT ASSEMBLY
- 3) RATCHET WHEEL
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101570

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

RATCHET WHEEL JAMS/BINDS. LOSS OF ALL FUNCTIONAL REDUNDANCY WOULD CAUSE LOSS OF VEHICLE DUE TO INABILITY TO CLOSE PLB DOORS AND DEORBIT. CREW ACTIONS REDUCE HARDWARE CRITICALITY BY ONE TO A "2". FAILURE OF REDUNDANT WINCH COULD RESULT IN LOSS OF LIFE OR VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101570

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/09/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 3410

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: EVA WINCH AND MOUNT ASSEMBLY ROPE ROLLER  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH AND MOUNT ASSEMBLY
- 3) ROPE ROLLER
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101570

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:  
ROPE ROLLER(S) BREAK. EVA WINCH SHOULD STILL BE ABLE TO  
FUNCTION.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101570

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/09/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 3411 ABORT: /NA

ITEM: EVA WINCH AND MOUNT ASSEMBLY ROPE ROLLER  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH AND MOUNT ASSEMBLY
- 3) ROPE ROLLER
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101570

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

ROPE ROLLER(S) JAM/BIND. EVA WINCH SHOULD STILL BE ABLE TO FUNCTION.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101570

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/09/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 3412

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: EVA WINCH AND MOUNT ASSEMBLY HANDLE  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH AND MOUNT ASSEMBLY
- 3) HANDLE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: SED33101570

CAUSES: MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

HOLDING HANDLE FOR EVA CREWMAN BREAKS. HANDLE BREAKAGE DOES NOT PREVENT OPERATION OF EVA WINCH. EVA CREWMAN CAN HOLD HANDRAIL WHILE OPERATING WINCH.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101570

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/09/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3413 ABORT: /NA

ITEM: EVA WINCH AND MOUNT ASSEMBLY MOUNTING PLATE  
ASSEMBLY  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH AND MOUNT ASSEMBLY
- 3) MOUNTING PLATE ASSEMBLY
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101570

CAUSES: OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

MOUNTING PLATE ASSEMBLY SEPARATES FROM EVA WINCH ASSEMBLY. LOSS OF ALL FUNCTIONAL REDUNDANCY WOULD RESULT IN LOSS OF VEHICLE DUE TO INABILITY TO CLOSE PLB DOORS OR RESTOW RMS AND DEORBIT. CREW ACTIONS REDUCE HARDWARE CRITICALITY BY ONE TO A "2". FAILURE OF REDUNDANT WINCH COULD RESULT IN LOSS OF LIFE OR VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101570

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3414 ABORT: /NA

ITEM: EVA WINCH AND MOUNT ASSEMBLY GEARS  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH AND MOUNT ASSEMBLY
- 3) GEARS
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101570

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:

TAKE UP GEAR(S) BREAK. LOSS OF ALL FUNCTIONAL REDUNDANCY WOULD CAUSE LOSS OF VEHICLE DUE TO INABILITY TO CLOSE PLB DOORS AND DEORBIT. CREW ACTIONS REDUCE HARDWARE CRITICALITY BY ONE TO A "2". FAILURE OF REDUNDANT WINCH COULD RESULT IN LOSS OF LIFE OR VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101570

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3415 ABORT: /NA

ITEM: EVA WINCH AND MOUNT ASSEMBLY GEARS  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH AND MOUNT ASSEMBLY
- 3) GEARS
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101570

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

TAKE UP GEARS BIND/JAM. LOSS OF ALL FUNCTIONAL REDUNDANCY WOULD CAUSE LOSS OF VEHICLE DUE TO INABILITY TO CLOSE PLB DOORS AND DEORBIT. CREW ACTIONS REDUCE HARDWARE CRITICALITY BY ONE TO A "2". FAILURE OF REDUNDANT WINCH COULD RESULT IN LOSS OF LIFE OR VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101570

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3416 ABORT: 2/1R

ITEM: EVA WINCH AND MOUNT ASSEMBLY PIP PIN  
FAILURE MODE: FAILS TO REMAIN ATTACHED

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH AND MOUNT ASSEMBLY
- 3) PIP PIN
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	2/1R
LIFTOFF:	2/1R	TAL:	2/1R
ONORBIT:	3/3	AOA:	2/1R
DEORBIT:	2/1R	ATO:	2/1R
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ F ] C [ P ]

LOCATION: PAYLOAD BAY

PART NUMBER: SED33101570

CAUSES: CONTAMINATION, PIECE-PART FAILURE, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

PIP PIN MAY WORK LOOSE DURING ATMOSPHERIC MANEUVERS. COULD COME LOOSE AND CAUSE LOSS OF VEHICLE FROM EVA WINCH IMPACTING CABLE BUNDLES, ETC. CREW WOULD HAVE NO KNOWLEDGE OF FAILURE UNTIL VEHICLE WENT OUT OF CONTROL. LOSS OF SECOND PIP PIN COULD RESULT IN CRIT 1 SITUATION THUS A HARDWARE CRIT 2 IS ASSIGNED.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101570

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/20/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3417 ABORT: /NA

ITEM: EVA WINCH AND MOUNT ASSEMBLY ROPE SPOOL  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH AND MOUNT ASSEMBLY
- 3) ROPE SPOOL
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33101570

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

ROPE SPOOL WILL NOT REEL OUT/TAKE IN ROPE. INABILITY OF SPOOL TO ROTATE AND LET OUT/TAKE UP ROPE WOULD CAUSE LOSS OF TOOL FUNCTION. POSSIBLE TO USE SECOND EVA WINCH AND MOUNT ASSEMBLY AS A REDUNDANT ITEM. LOSS OF ALL FUNCTIONAL REDUNDANCY WOULD RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-12770 SFOM VOL. 15, JSC-20466, SED33101570

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3500 ABORT: /NA

ITEM: EVA WINCH ADAPTER ASSEMBLY ROPE  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH ADAPTER ASSEMBLY
- 3) ROPE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33102348

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:

ROPE BREAKS. EVA WINCH ADAPTER IS USED AS AN EXTENSION TO THE EVA WINCH TO RESTOW RMS. ONLY ONE WINCH ADAPTER CARRIED PER FLIGHT. INABILITY TO STOW OR JETTISON RMS WOULD PREVENT VEHICLE DEORBIT. MAY BE POSSIBLE TO USE SECOND EVA WINCH AND MOUNT ASSEMBLY AS REDUNDANT ITEM. LOSS OF ALL REDUNDANCY, LIKE AND UNLIKE, COULD RESULT IN LOSS OF LIFE OR VEHICLE.

REFERENCES: JSC-20466, SED33102348

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3501 ABORT: /NA

ITEM: EVA WINCH ADAPTER ASSEMBLY ROPE  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH ADAPTER ASSEMBLY
- 3) ROPE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/N
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33102348

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

ROPE JAMS. EVA WINCH ADAPTER IS USED AS AN EXTENSION TO THE EVA WINCH TO RESTOW RMS. ONLY ONE WINCH ADAPTER CARRIED PER FLIGHT. INABILITY TO STOW OR JETTISON RMS WOULD PREVENT VEHICLE DEORBIT. MAY BE POSSIBLE TO USE SECOND EVA WINCH AND MOUNT ASSEMBLY AS REDUNDANT ITEM. LOSS OF ALL REDUNDANCY, LIKE AND UNLIKE, COULD RESULT IN LOSS OF LIFE OR VEHICLE.

REFERENCES: JSC-20466, SED33102348

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3502 ABORT: /NA

ITEM: EVA WINCH ADAPTER ASSEMBLY HOOK  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH ADAPTER ASSEMBLY
- 3) HOOK
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33102348

CAUSES: OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

HOOK BREAKS. MAY BE ABLE TO USE SECOND EVA WINCH AND MOUNT ASSEMBLY ALONG WITH FIRST EVA WINCH AND MOUNT ASSEMBLY TO ACCOMPLISH THE SAME FUNCTION AS FIRST EVA WINCH AND MOUNT ASSEMBLY AND EVA WINCH ADAPTER ASSEMBLY. CREW MAY BE ABLE TO TIE ROPE AROUND RMS TO REPLACE FUNCTION OF HOOK. INABILITY TO STOW OR JETTISON RMS WOULD PREVENT VEHICLE DEORBIT.

REFERENCES: JSC-20466, SED33102348

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 3503 ABORT: /NA

ITEM: EVA WINCH ADAPTER ASSEMBLY HOOK LATCH  
FAILURE MODE: FAILS TO OPEN/CLOSE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH ADAPTER ASSEMBLY
- 3) HOOK LATCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33102348

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

HOOK LATCH JAMS OPEN OR CLOSED. EVA CREWMAN CAN BEND LATCH CLOSED OR OPEN (AS NEEDED) TO ALLOW EVA WINCH ADAPTER TO FUNCTION CORRECTLY. CREWMAN CAN ALSO TIE ROPE AROUND RMS TO AVOID USING HOOK AND FAILED LATCH.

REFERENCES: JSC-20466, SED33102348

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 3504

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 2/1R  
ABORT: /NA

ITEM: EVA WINCH ADAPTER ASSEMBLY ROPE CAM CLEAT  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH ADAPTER ASSEMBLY
- 3) ROPE CAM CLEAT
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33102348

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

CAM CLEAT BREAKS. ROPE CAN BE HELD IN PLACE BY ACTION OF ONE CAM CLEAT. LOSS OF TOOL FUNCTION MAY PREVENT STOWAGE OF FAILED RMS THUS RESULTING IN LOSS OF LIFE AND VEHICLE. EVA CREW ACTIONS MAY BE ABLE TO REPAIR TOOL.

REFERENCES: JSC-20466, SED33102348

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3505 ABORT: /NA

ITEM: EVA WINCH ADAPTER ASSEMBLY ROPE CAM CLEAT  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH ADAPTER ASSEMBLY
- 3) ROPE CAM CLEAT
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33102348

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

CAM CLEATS JAM. ROPE CAN BE HELD IN PLACE BY ACTION OF ONE CAM CLEAT. LOSS OF TOOL FUNCTION MAY PREVENT STOWAGE OF FAILED RMS THUS RESULTING IN LOSS OF LIFE OR VEHICLE. EVA CREW MAY BE ABLE TO REPAIR TOOL.

REFERENCES: JSC-20466, SED33102348

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3506 ABORT: /NA

ITEM: EVA WINCH ADAPTER ASSEMBLY ROPE GUIDE PLATE  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH ADAPTER ASSEMBLY
- 3) ROPE GUIDE PLATE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33102348

CAUSES: STRUCTURAL FAILURE

EFFECTS/RATIONALE:

ROPE GUIDE PLATE FAILS AND SEPARATES FROM SPOOL. WHEN ROPE IS UNDER TENSION GUIDE PLATE MAY STRUCTURALLY FAIL THUS PREVENTING TOOL FROM FUNCTIONING. EVA WINCH LATCH ATTACHES TO GUIDE PLATE. LOSS OF TOOL FUNCTION PREVENTS RESTOWING OF DISABLED RMS. INABILITY TO CLOSE PLBD CAN RESULT IN LOSS OF LIFE AND VEHICLE. MAY BE ABLE TO USE SECOND EVA WINCH AND MOUNT ASSEMBLY TO REPLACE FUNCTION. CREW ACTIONS COULD REDUCE HARDWARE CRITICALITY BY ONE TO A "2".

REFERENCES: JSC-20466, SED33102348

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 3507 ABORT: /NA

ITEM: EVA WINCH ADAPTER ASSEMBLY ROPE ROLLER  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH ADAPTER ASSEMBLY
- 3) ROPE ROLLER
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33102348

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

ROLLER BREAKS. WINCH ADAPTER ASSEMBLY (RMS ROPE REEL) CAN STILL FUNCTION.

REFERENCES: JSC-20466, SED33102348

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 3508 ABORT: /NA

ITEM: EVA WINCH ADAPTER ASSEMBLY ROPE ROLLER  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH ADAPTER ASSEMBLY
- 3) ROPE ROLLER
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: SED33102348

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

ROPE ROLLER FAILS TO TURN. WINCH ADAPTER ASSEMBLY (RMS ROPE REEL) CAN STILL FUNCTION.

REFERENCES: JSC-20466, SED33102348

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/06/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3509 ABORT: /NA

ITEM: EVA WINCH ADAPTER ASSEMBLY ROPE SPOOL  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA WINCH ADAPTER ASSEMBLY
- 3) ROPE SPOOL
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33102348

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

ROPE SPOOL WILL NOT REEL OUT/IN ROPE. INABILITY OF SPOOL TO ROTATE AND LET OUT/TAKE UP ROPE WOULD CAUSE LOSS OF TOOL FUNCTION. MAY BE POSSIBLE TO USE SECOND EVA WINCH AND MOUNT ASSEMBLY AS REDUNDANT ITEM. LOSS OF ALL REDUNDANCY WOULD RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-20466, SED33102348

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3600 ABORT: /NA

ITEM: PAYLOAD RETENTION DEVICE ASSEMBLY RATCHET HANDLE  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PAYLOAD RETENTION DEVICE ASSEMBLY
- 3) RATCHET HANDLE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10163-10063-03

CAUSES: MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

HANDLE BREAKS. TWO DEVICES FLOWN ON EACH FLIGHT. LOSS OF TOOL FUNCTION COULD RESULT IN LOSS OF LIFE AND VEHICLE. CREW ACTIONS CAN REDUCE HARDWARE CRITICALITY BY ONE TO A "2".

REFERENCES: JSC-20466, 10163-10063

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 3601 ABORT: /NA

ITEM: PAYLOAD RETENTION DEVICE ASSEMBLY HOOK  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PAYLOAD RETENTION DEVICE ASSEMBLY
- 3) HOOK
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	1/1	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10163-10063-03

CAUSES: MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

HOOK(S) BREAKS. TWO DEVICES FLOWN ON EACH FLIGHT. NO OPERATIONAL REDUNDANCY FOR THIS TOOL. LOSS OF TOOL FUNCTION COULD RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-20466, 10163-10063

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/10/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 3602

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 2/1R  
ABORT: /NA

ITEM: PAYLOAD RETENTION DEVICE ASSEMBLY HOOK LATCH  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PAYLOAD RETENTION DEVICE ASSEMBLY
- 3) HOOK LATCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	2/1R	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ]      B [ P ]      C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10163-10063-03

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

HOOK LATCH BREAKS. TWO DEVICES FLOWN ON EACH FLIGHT. LOSS OF TOOL FUNCTION COULD RESULT IN LOSS OF LIFE AND VEHICLE. CREW ACTIONS CAN REDUCE HARDWARE CRITICALITY BY ONE TO A "2".

REFERENCES: JSC-20466, 10163-10063

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3603 ABORT: /NA

ITEM: PAYLOAD RETENTION DEVICE ASSEMBLY HOOK LATCH  
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PAYLOAD RETENTION DEVICE ASSEMBLY
- 3) HOOK LATCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10163-10063-03

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

HOOK LATCH FAILS TO CLOSE. TWO DEVICES FLOWN ON EACH FLIGHT.  
LOSS OF TOOL FUNCTION COULD RESULT IN LOSS OF LIFE AND VEHICLE.  
CREW ACTIONS CAN REDUCE HARDWARE CRITICALITY BY ONE TO A "2".

REFERENCES: JSC-20466, 10163-10063

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 3604 ABORT: /NA

ITEM: PAYLOAD RETENTION DEVICE ASSEMBLY RATCHET GEAR  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PAYLOAD RETENTION DEVICE ASSEMBLY
- 3) RATCHET GEAR
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	1/1	AOA:	/NA
DEORBIT:	3/3	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10163-10063-03

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

RATCHET GEAR BINDS/JAMS. TWO DEVICES FLOWN ON EACH FLIGHT. NO OPERATIONAL REDUNDANCY FOR THIS TOOL. LOSS OF TOOL FUNCTION COULD RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-20466, 10163-10063

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 3605 ABORT: /NA

ITEM: PAYLOAD RETENTION DEVICE ASSEMBLY RATCHET GEAR  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PAYLOAD RETENTION DEVICE ASSEMBLY
- 3) RATCHET GEAR
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	1/1	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10163-10063-03

CAUSES: OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

RATCHET GEAR BREAKS. TWO DEVICES FLOWN ON EACH FLIGHT. NO OPERATIONAL REDUNDANCY FOR THIS TOOL. LOSS OF TOOL FUNCTION COULD RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-20466, 10163-10063

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/10/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 3606

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 1/1  
ABORT: /NA

ITEM: PAYLOAD RETENTION DEVICE ASSEMBLY KEVLAR WEB STRAP  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PAYLOAD RETENTION DEVICE ASSEMBLY
- 3) KEVLAR WEB STRAP
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	1/1	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ]      B [ ]      C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: 10163-10063-03

CAUSES: MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

KEVLAR WEB STRAP BREAKS. TWO DEVICES FLOWN ON EACH FLIGHT. NO OPERATIONAL REDUNDANCY FOR THIS TOOL. LOSS OF TOOL FUNCTION COULD RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-20466, 10163-10063

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 3607 ABORT: /NA

ITEM: PAYLOAD RETENTION DEVICE ASSEMBLY REACTION HANDLE  
ASSEMBLY  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PAYLOAD RETENTION DEVICE ASSEMBLY
- 3) REACTION HANDLE ASSEMBLY
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10163-10063-03

CAUSES: MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

REACTION HANDLE ASSEMBLY BREAKS. TWO DEVICES FLOWN ON EACH FLIGHT. LOSS OF REACTION HANDLE WILL NOT CAUSE LOSS OF TOOL FUNCTION.

REFERENCES: JSC-20466, 10163-10063

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 3608 ABORT: /NA

ITEM: PAYLOAD RETENTION DEVICE ASSEMBLY RATCHET SHAFT  
PIN  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PAYLOAD RETENTION DEVICE ASSEMBLY
- 3) RATCHET SHAFT PIN
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	1/1	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10163-10063-03

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:  
RATCHET SHAFT PIN BREAKS. TWO DEVICES FLOWN ON EACH FLIGHT. NO  
OPERATIONAL REDUNDANCY FOR THIS TOOL. LOSS OF TOOL FUNCTION  
COULD RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-20466, 10163-10063

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 3609 ABORT: /NA

ITEM: PAYLOAD RETENTION DEVICE ASSEMBLY WEB ROLLER  
ASSEMBLY  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PAYLOAD RETENTION DEVICE ASSEMBLY
- 3) WEB ROLLER ASSEMBLY
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10163-10063-03

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

ROLLER GUIDE ASSEMBLY FOR KEVLAR WEB STRAP BINDS/JAMS. CAN STILL FUNCTION TO TIE DOWN RMS.

REFERENCES: JSC-20466, 10163-10063

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 3610 ABORT: /NA

ITEM: PAYLOAD RETENTION DEVICE ASSEMBLY WEB ROLLER  
ASSEMBLY  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PAYLOAD RETENTION DEVICE ASSEMBLY
- 3) WEB ROLLER ASSEMBLY
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10163-10063-03

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:  
ROLLER GUIDE ASSEMBLY FOR KEVLAR WEB STRAP BREAKS. CAN STILL  
FUNCTION TO TIE DOWN RMS.

REFERENCES: JSC-20466, 10163-10063

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 3611 ABORT: /NA

ITEM: PAYLOAD RETENTION DEVICE ASSEMBLY SPRING STORAGE  
REEL  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PAYLOAD RETENTION DEVICE ASSEMBLY
- 3) SPRING STORAGE REEL
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10163-10063-03

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

SPRING STORAGE REEL BINDS/JAMS. TWO DEVICES FLOWN ON EACH FLIGHT. LOSS OF SPRING STORAGE REEL COULD RESULT IN LOSS OF TOOL FUNCTION. LOSS OF TOOL FUNCTION COULD RESULT IN LOSS OF MISSION. IF NEITHER TOOL IS EFFECTIVE AS A TIEDOWN - THE DEVICE BEING RESTRAINED MAY HAVE TO BE JETTISONED PRIOR TO REENTRY.

REFERENCES: JSC-20466, 10163-10063

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 3612 ABORT: /NA

ITEM: PAYLOAD RETENTION DEVICE ASSEMBLY RATCHET LATCH  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PAYLOAD RETENTION DEVICE ASSEMBLY
- 3) RATCHET LATCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	1/1	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10163-10063-03

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:

RATCHET LATCH BREAKS. TWO DEVICES FLOWN ON EACH FLIGHT. NO OPERATIONAL REDUNDANCY FOR THIS TOOL. LOSS OF TOOL FUNCTION COULD RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-20466, 10163-10063

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 3613 ABORT: /NA

ITEM: PAYLOAD RETENTION DEVICE ASSEMBLY RATCHET LATCH  
FAILURE MODE: FAILS TO CONTACT RATCHET WHEEL

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PAYLOAD RETENTION DEVICE ASSEMBLY
- 3) RATCHET LATCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	1/1	AOA:	/NA
DEORBIT:	1/1	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10163-10063-03

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

RATCHET LATCH FAILS TO CONTACT GEAR. TWO DEVICES FLOWN ON EACH FLIGHT. NO OPERATIONAL REDUNDANCY FOR THIS TOOL. LOSS OF TOOL FUNCTION COULD RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-20466, 10163-10063

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/10/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 3614

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 1/1  
ABORT: /NA

ITEM: PAYLOAD RETENTION DEVICE ASSEMBLY RATCHET ASSEMBLY  
RELEASE  
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PAYLOAD RETENTION DEVICE ASSEMBLY
- 3) RATCHET ASSEMBLY RELEASE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	1/1	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10163-10063-03

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

RATCHET ASSEMBLY RELEASE IS UNABLE TO CLOSE (ENGAGE RATCHET WHEEL). TWO DEVICES FLOWN ON EACH FLIGHT. NO OPERATIONAL REDUNDANCY FOR THIS TOOL. LOSS OF TOOL FUNCTION COULD RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-20466, 10163-10063

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 3615 ABORT: /NA

ITEM: PAYLOAD RETENTION DEVICE ASSEMBLY RATCHET ASSEMBLY  
RELEASE  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PAYLOAD RETENTION DEVICE ASSEMBLY
- 3) RATCHET ASSEMBLY RELEASE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	1/1	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10163-10063-03

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

RATCHET ASSEMBLY RELEASE BINDS/JAMS. TWO DEVICES FLOWN ON EACH FLIGHT. NO OPERATIONAL REDUNDANCY FOR THIS TOOL. LOSS OF TOOL FUNCTION COULD RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-20466, 10163-10063

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/10/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 1/1  
MDAC ID: 3616 ABORT: /NA

ITEM: PAYLOAD RETENTION DEVICE ASSEMBLY HOOK/WEB CONNECT  
PIN  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) PAYLOAD RETENTION DEVICE ASSEMBLY
- 3) LATCH/WEB CONNECT PIN
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	1/1	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: 10163-10063-03

CAUSES: OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

HOOK/WEB CONNECT PIN BREAKS. PAYLOAD RETENTION DEVICE LOSES FUNCTION. NO OPERATIONAL REDUNDANCY FOR THIS TOOL. LOSS OF TOOL FUNCTION COULD RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-20466, 10163-10063

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 3/14/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 3700 ABORT: /NA

ITEM: EVA CABLE CUTTER  
FAILURE MODE: FAILS TO OPEN/CLOSE, PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA CABLE CUTTER
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED39117075-301

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

CUTTERS JAM AND CREWMEN IS UNABLE TO OPEN/CLOSE (AS NEEDED TO COMPLETE THE MISSION). BACKUP TOOL IS DIAGONAL CUTTER (WHICH IS NORMALLY MANIFESTED).

REFERENCES: JSC-20466

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 3/14/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 3701 ABORT: /NA

ITEM: EVA CABLE CUTTER  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA CABLE CUTTER
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED39117075-301

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

HANDLE BREAKS THEREBY RENDERING CREWMAN UNABLE TO COMPLETE  
ORBITER MISSION. BACKUP TOOL IS DIAGONAL CUTTER (WHICH IS  
NORMALLY MANIFESTED).

REFERENCES: JSC-20466

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 3/14/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 3702 ABORT: /NA

ITEM: EVA CABLE CUTTER  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) EVA CABLE CUTTER
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SEC39117075-301

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

JAWS DEFORMED, UNABLE TO CUT CABLE. BACKUP TOOL IS DIAGONAL CUTTER (WHICH IS NORMALLY MANIFESTED).

REFERENCES: JSC-20466

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3800 ABORT: /NA

ITEM: SNATCH BLOCK ASSEMBLY HOOK LATCH  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) SNATCH BLOCK ASSEMBLY
- 3) HOOK LATCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY

PART NUMBER: SED33102357

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

NORMALLY MANIFESTED ON EVERY FLIGHT. TWO SNATCH BLOCKS CARRIED ON EACH FLIGHT. FAILURE OF BOTH PRIMARY AND REDUNDANT BLOCK MAY CAUSE LOSS OF LIFE/VEHICLE WHEN BEING USED TO STOW FAILED RMS OR RESTOW IUS TILT CRADLE. FAILURE TO OPEN LATCH WOULD PREVENT SNATCH BLOCK BEING ATTACHED TO ORBITER OR AEROSPACE SUPPORT EQUIPMENT ON-ORBIT.

REFERENCES: JSC-20466, SED33102357

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3801 ABORT: /NA

ITEM: SNATCH BLOCK ASSEMBLY HOOK SWIVEL  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) SNATCH BLOCK ASSEMBLY
- 3) HOOK SWIVEL
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33102357

CAUSES: CONTAMINATION, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

FAILURE OF SWIVEL COULD PREVENT SUCCESSFUL OPERATION OF SNATCH BLOCK. TWO SNATCH BLOCKS FLOWN ON EACH FLIGHT.

REFERENCES: JSC-20466, SED33102357

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 3802 ABORT: /NA

ITEM: SNATCH BLOCK ASSEMBLY RIGHT SPRING PLUNGER  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) SNATCH BLOCK ASSEMBLY
- 3) RIGHT SPRING PLUNGER
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: SED33102357

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

SPRING PLUNGER BALL FAILS TO TRAVEL UP/DOWN THUS PREVENTING UPPER RIGHT CHEEK BLOCK FROM CONTACTING HOOK/LATCH ASSEMBLY. TWO SPRING PLUNGERS USED ON RIGHT SIDE, ANY ONE OF WHICH WILL PROVIDE SUFFICIENT PUSHING FORCE ON CHEEK BLOCK. SHOULD NOT RELEASE HOOK/LATCH ASSEMBLY DUE TO TENSION ON DEVICE.

REFERENCES: JSC-20466, SED33102357

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 3803 ABORT: /NA

ITEM: SNATCH BLOCK ASSEMBLY LEFT SPRING PLUNGER  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) SNATCH BLOCK ASSEMBLY
- 3) LEFT SPRING PLUNGER
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33102357

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

SPRING PLUNGER FAILS TO TRAVEL UP/DOWN THUS PREVENTING LEFT CHECK BLOCK FROM PUSHING AGAINST HOOK/LATCH ASSEMBLY. SHOULD NOT RELEASE DUE TO TENSION ON DEVICE. TWO SPRING PLUNGERS USED ON LEFT SIDE, ANY ONE OF WHICH WOULD PROVIDE SUFFICIENT PUSHING FORCE ON CHEEK BLOCK.

REFERENCES: JSC-20466, SED33102357

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 3804 ABORT: /NA

ITEM: SNATCH BLOCK ASSEMBLY PULL WIRE BALL END  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) SNATCH BLOCK ASSEMBLY
- 3) PULL WIRE BALL END
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33102357

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

BALL COMES OFF ALLOWING EVA PULL WIRE TO DRIFT OUT AND AWAY (LOST). EVA CREWMAN CAN STILL OPERATE RELEASE BLOCK BY MANUALLY PULLING ON "EARS" OF LATCH RELEASE BLOCK. TWO SNATCH BLOCKS FLOWN ON EACH FLIGHT.

REFERENCES: JSC-20466, SED33102357

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3805 ABORT: /NA

ITEM: SNATCH BLOCK ASSEMBLY HOOK ASSEMBLY LATCH BLOCK  
FAILURE MODE: FAILS TO REMAIN CLOSED

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) SNATCH BLOCK ASSEMBLY
- 3) HOOK ASSEMBLY LATCH BLOCK
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33102357

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

TWO SNATCH BLOCKS FLOWN ON EACH FLIGHT. IF LATCH BLOCK FAILS TO STAY CLOSED THE HOOK/LATCH ASSEMBLY COULD COME LOOSE, THEREBY RELEASING ROPE DURING CRIT 1 EVA ACTIVITIES.

REFERENCES: JSC-20466, SED33102357

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 3806 ABORT: /NA

ITEM: SNATCH BLOCK ASSEMBLY PULLEY WHEEL  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) SNATCH BLOCK ASSEMBLY
- 3) PULLEY WHEEL
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PAYLOAD BAY

PART NUMBER: SED33102357

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

ROPE CAN STILL TRAVEL OVER JAMMED PULLEY WHEEL THUS ALLOWING SNATCH BLOCK ASSEMBLY TO CONTINUE TO FUNCTION. ROPE MAY, HOWEVER, SUFFER SUFFICIENT WEAR TO PRECLUDE REPEATED USE. TWO SNATCH BLOCK ASSEMBLIES FLOWN ON EACH FLIGHT.

REFERENCES: JSC-20466, SED33102357

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 3807 ABORT: /NA

ITEM: SNATCH BLOCK ASSEMBLY HOOK  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) SNATCH BLOCK ASSEMBLY
- 3) HOOK
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: PAYLOAD BAY  
PART NUMBER: SED33102357

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

HOOK BREAKS. UNABLE TO ATTACH SNATCH BLOCK TO ORBITER OR AEROSPACE SUPPORT EQUIPMENT ON-ORBIT. TWO SNATCH BLOCKS FLOWN ON EACH FLIGHT.

REFERENCES: JSC-20466, SED33102357

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/05/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 4100 ABORT: /NA

ITEM: TURNBUCKLE  
FAILURE MODE: QUICK RELEASE PIN FAILS, UNABLE TO ATTACH TO  
ORBITER STRUCTURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TURNBUCKLE
- 3) QUICK RELEASE PIN
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: V602-660302

CAUSES: WEAR, MISHANDLING BY CREWMAN

EFFECTS/RATIONALE:

CREWMEN CAN BEND PIN PRONGS BACK. ALSO, CREWMAN CAN DEVELOP ALTERNATIVE METHODS TO MAINTAIN STRUCTURAL INTEGRITY DURING FORWARD AVIONICS BAY REPAIR TASKS. THREE TURNBUCKLES FLOWN ON EACH FLIGHT.

REFERENCES: JSC-12770 VOL. 12, V602-660302

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/05/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 4101 ABORT: /NA

ITEM: TURNBUCKLE

FAILURE MODE: HINGES FAIL TO MAINTAIN POSITION WHEN TURNBUCKLE  
SET IN PLACE DUE TO STRIPPED THREADS

LEAD ANALYST: L. GRAHAM

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TURNBUCKLE
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE

PART NUMBER: V602-660302

CAUSES: WEAR, MISHANDLING BY CREW

EFFECTS/RATIONALE:

CREWMAN CAN TAPE HINGES IN PLACE TO MAINTAIN POSITIONING. ALSO  
CREWMAN CAN DEVELOP ALTERNATIVE METHODS TO MAINTAIN STRUCTURAL  
INTEGRITY DURING FORWARD AVIONICS BAY REPAIR TASKS. THREE  
TURNBUCKLES FLOWN ON EACH FLIGHT.

REFERENCES: JSC-12770 VOL. 12, V602-660302

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/05/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 2/1R  
MDAC ID: 4200 ABORT: /NA

ITEM: LOCKER REMOVAL TOOL  
FAILURE MODE: HEX HEAD IS ROUNDED OFF, UNABLE TO ENGAGE LOCKER  
HOLDERS TO REMOVE LOCKERS.

LEAD ANALYST: L. GRAHAM

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) LOCKER REMOVAL TOOL
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	2/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: V625-650899

CAUSES: CREW MISHANDLING, WEAR

EFFECTS/RATIONALE:

IF CREW IS UNABLE TO REMOVE LOCKERS FOR ACCESS TO FORWARD AVIONICS BAY, LOSS OF CREW/VEHICLE MAY RESULT. MORE THAN ONE REMOVAL TOOL CARRIED ON EACH FLIGHT.

REFERENCES: JSC-12770 VOL. 12, V625-650899

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/1R  
MDAC ID: 4300 ABORT: /NA

ITEM: IFM BREAKOUT BOX INPUT POWER CONNECTOR  
FAILURE MODE: SHORTED

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) IFM BREAKOUT BOX
- 3) INPUT POWER CONNECTOR
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: 10134-20001

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE,  
VIBRATION

EFFECTS/RATIONALE:

INPUT POWER CONNECTOR SHORTS. TWO IFM BREAKOUT BOXES FLOWN ON EACH FLIGHT. CREW CAN ALSO PERFORM AN IN-FLIGHT REPAIR ON BROKEN INPUT CONNECTOR. CREW ACTIONS CAN THEREBY REDUCE HARDWARE CRITICALITY ONE LEVEL TO "3". BOX SUPPLIES POWER FOR VARIOUS CONTINGENCY SITUATIONS THAT COULD CAUSE LOSS OF LIFE AND VEHICLE.

REFERENCES: 10134-20001, JSC-17321, IFM BREAKOUT BOX ELECTRICAL SCHEMATIC

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 4301

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/1R  
ABORT: /NA

ITEM: IFM BREAKOUT BOX INPUT POWER CONNECTOR  
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) IFM BREAKOUT BOX
- 3) INPUT POWER CONNECTOR
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: 10134-20001

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:

INPUT POWER CONNECTOR HAS AN OPEN CIRCUIT. TWO IFM BREAKOUT BOXES FLOWN ON EACH FLIGHT. CREW CAN ALSO PERFORM AN IN-FLIGHT REPAIR ON BROKEN INPUT CONNECTION. CREW ACTIONS CAN THEREBY REDUCE HARDWARE CRITICALITY ONE LEVEL TO "3". BREAKOUT BOX SUPPLIES POWER FOR VARIOUS CONTINGENCY SITUATIONS THAT COULD CAUSE LOSS OF LIFE AND VEHICLE.

REFERENCES: 10134-20001, JSC-17321, IFM BREAKOUT BOX ELECTRICAL SCHEMATIC

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 4302 ABORT: /NA

ITEM: IFM BREAKOUT BOX AUXILIARY ON/OFF SWITCH (SW1)  
FAILURE MODE: SHORTED

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) IFM BREAKOUT BOX
- 3) AUXILIARY ON/OFF SWITCH (SW1)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: 10134-20001

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:

SW1 SHORTS. TWO BREAKOUT BOXES FLOWN ON EACH FLIGHT. SWITCH ONLY PROVIDES POWER TO OUTPUT POWER CONNECTOR. OUTPUT CONNECTOR IS INTENDED TO BE USED AS POWER SOURCE FOR SECOND IFM BREAKOUT BOX USE. CURRENT IFM PROCEDURES NO LONGER REQUIRE USE OF 2 BREAKOUT BOXES SIMULTANEOUSLY.

REFERENCES: 10134-20001, JSC-17321, IFM BREAKOUT BOX ELECTRICAL SCHEMATIC

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 4303 ABORT: /NA

ITEM: IFM BREAKOUT BOX AUXILIARY ON/OFF SWITCH (SW1)  
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) IFM BREAKOUT BOX
- 3) AUXILIARY ON/OFF SWITCH (SW1)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE

PART NUMBER: 10134-20001

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:

SW1 HAS AN OPEN CIRCUIT. TWO IFM BREAKOUT BOXES FLOWN ON EACH FLIGHT. SWITCH ONLY PROVIDES POWER TO OUTPUT POWER CONNECTOR. OUTPUT CONNECTOR IS INTENDED TO BE USED AS POWER SOURCE FOR SECOND IFM BREAKOUT BOX USE. CURRENT IFM PROCEDURES NO LONGER REQUIRE USE OF 2 BREAKOUT BOXES SIMULTANEOUSLY.

REFERENCES: 10134-20001, JSC-17321, IFM BREAKOUT BOX ELECTRICAL SCHEMATIC

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 4304 ABORT: /NA

ITEM: IFM BREAKOUT BOX OUTPUT POWER CONNECTOR  
FAILURE MODE: SHORTED

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) IFM BREAKOUT BOX
- 3) OUTPUT POWER CONNECTOR
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: 10134-20001

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE,  
VIBRATION

EFFECTS/RATIONALE:

OUTPUT POWER CONNECTOR SHORTS. TWO BREAKOUT BOXES FLOWN ON EACH FLIGHT. OUTPUT CONNECTOR IS INTENDED TO BE USED AS POWER SOURCE FOR SECOND IFM BREAKOUT BOX USE. CURRENT IFM PROCEDURES NO LONGER REQUIRE USE OF 2 BREAKOUT BOXES SIMULTANEOUSLY.

REFERENCES: 10134-20001, JSC-17321, IFM BREAKOUT BOX ELECTRICAL SCHEMATIC

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 4305 ABORT: /NA

ITEM: IFM BREAKOUT BOX OUTPUT POWER CONNECTOR  
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) IFM BREAKOUT BOX
- 3) OUTPUT POWER CONNECTOR
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE

PART NUMBER: 10134-20001

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:

OUTPUT POWER CONNECTOR HAS OPEN CIRCUIT. TWO IFM BREAKOUT BOXES FLOWN ON EACH FLIGHT. OUTPUT CONNECTOR IS INTENDED TO BE USED AS POWER SOURCE FOR SECOND IFM BREAKOUT BOX USE. CURRENT IFM PROCEDURES NO LONGER REQUIRE USE OF 2 BREAKOUT BOXES SIMULTANEOUSLY.

REFERENCES: 10134-20001, JSC-17321, IFM BREAKOUT BOX ELECTRICAL SCHEMATIC

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT, FLIGHT: 3/1R  
MDAC ID: 4306 ABORT: /NA

ITEM: IFM BREAKOUT BOX FUSE  
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) IFM BREAKOUT BOX
- 3) FUSE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: 10134-20001

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:

FUSE OPENS. TWO IFM BREAKOUT BOXES FLOWN ON EACH FLIGHT. SPARE FUSE CARRIED IN PIN KIT. CREW REPAIRS CAN REDUCE HARDWARE CRITICALITY TO "3". BOX SUPPLIES POWER FOR VARIOUS CONTINGENCY SITUATIONS THAT COULD CAUSE LOSS OF LIFE AND VEHICLE.

REFERENCES: 10134-20001, JSC-17321, IFM BREAKOUT BOX ELECTRICAL SCHEMATIC

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/1R  
MDAC ID: 4307 ABORT: /NA

ITEM: IFM BREAKOUT BOX FUSE HOLDER  
FAILURE MODE: INADVERTENT OPERATION, CAP COMES LOOSE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) IFM BREAKOUT BOX
- 3) FUSE HOLDER
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE

PART NUMBER: 10134-20001

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE,  
VIBRATION

EFFECTS/RATIONALE:

FUSE HOLDER CAP COMES LOOSE AND FUSE LEAVES BOX DURING  
CONTINGENCY OPERATION. TWO IFM BREAKOUT BOXES FLOWN ON EACH  
FLIGHT. WORST CASE WOULD PRECLUDE REATTACHMENT OF FUSE HOLDER  
CAP. CREW CAN USE SECOND BREAKOUT BOX OR TAPE BROKEN CAP INTO  
POSITION. CREW ACTION CAN REDUCE HARDWARE CRITICALITY BY ONE TO  
A "3". LOSS OF FUSE COULD RESULT IN LOSS OF BREAKOUT BOX  
FUNCTION. LOSS OF ALL REDUNDANCY COULD RESULT IN LOSS OF LIFE  
AND VEHICLE.

REFERENCES: 10134-20001, JSC-17321, IFM BREAKOUT BOX ELECTRICAL  
SCHEMATIC

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 4308 ABORT: /NA

ITEM: IFM BREAKOUT BOX AWG OUTPUT SELECT SWITCH (SW3)  
FAILURE MODE: SHORTED

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) IFM BREAKOUT BOX
- 3) AWG OUTPUT SELECT SWITCH (SW3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: 10134-20001

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:

SW3 SHORTS. TWO IFM BREAKOUT BOXES FLOWN ON EACH FLIGHT. SWITCH SHORTS (28 V) TO ONE OF FOUR SETS OF AWG PIN HOLES. CREW IS UNABLE TO TURN SWITCH OFF OR SET TO ANOTHER PIN HOLE SET. CREW CAN OVERCOME FUNCTION OF BROKEN SWITCH BY USING ORBITER-SIDE POWER OUTLET SWITCH.

REFERENCES: 10134-20001, JSC-17321, IFM BREAKOUT BOX ELECTRICAL SCHEMATIC

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/1R  
MDAC ID: 4309 ABORT: /NA

ITEM: IFM BREAKOUT BOX AWG OUTPUT SELECT SWITCH (SW3)  
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) IFM BREAKOUT BOX
- 3) AWG OUTPUT SELECT SWITCH (SW3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE

PART NUMBER: 10134-20001

CAUSES: PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:

SW3 HAS OPEN CIRCUIT OR SHORT CIRCUIT TO "OFF" SETTING. TWO IFM BREAKOUT BOXES FLOWN ON EACH FLIGHT. CREW CAN USE VARIABLE POWER CIRCUIT (LIGHTING) SET TO 28 V, TO OVERCOME LOSS OF SWITCH FUNCTION. CREW CAN ALSO USE SECOND BREAKOUT BOX AS REPLACEMENT. AS A LAST RESORT CREW CAN PERFORM IFM ON BREAKOUT BOX. LOSS OF ALL REDUNDANCY COULD RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: 10134-20001, JSC-17321, IFM BREAKOUT BOX ELECTRICAL SCHEMATIC

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/1R  
MDAC ID: 4310 ABORT: /NA

ITEM: IFM BREAKOUT BOX PIN CONNECTION OUTLET  
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) IFM BREAKOUT BOX
- 3) PIN CONNECTION OUTLET
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: 10134-20001

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:

12 HOLE PIN CONNECTION OUTLET HAS NO ELECTRICAL OUTPUT DUE TO CONTAMINATED (PLUGGED) HOLES OR BROKEN CONNECTION. TWO IFM BREAKOUT BOXES FLOWN ON EACH FLIGHT. CREW COULD USE OTHER PIN CONNECTION OUTLET ON SAME BOX (ASSUMING 28V NEEDED) OR USE SECOND BREAKOUT BOX. CREW CAN ALSO PERFORM IFM ON BREAKOUT BOX TO REPAIR PIN CONNECTION OUTLET. LOSS OF ALL REDUNDANCY COULD RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: 10134-20001, JSC-17321, IFM BREAKOUT BOX ELECTRICAL SCHEMATIC

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 4311 ABORT: /NA

ITEM: IFM BREAKOUT BOX PIN/WIRE HOLDING BRACKET  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) IFM BREAKOUT BOX
- 3) PIN/WIRE HOLDING BRACKET
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE

PART NUMBER: 10134-20001

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

PIN/WIRE HOLDING BRACKET BINDS/JAMS. UNABLE TO BE ADJUSTED TO HOLD PIN/WIRE STRUCTURE IN PLACE IN THE PIN CONNECTION OUTLET. TWO IFM BREAKOUT BOXES FLOWN ON EACH FLIGHT. NOT REALLY NEEDED SINCE PIN AND HOLE HAVE A POSITIVE SNUG FIT. CREW CAN ALSO USE TAPE TO HOLD PIN IN PLACE.

REFERENCES: 10134-20001, JSC-17321, IFM BREAKOUT BOX ELECTRICAL SCHEMATIC

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/1R  
MDAC ID: 4312 ABORT: /NA

ITEM: IFM BREAKOUT BOX VARIABLE VOLTAGE POWER SUPPLY  
FAILURE MODE: SHORTED

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) IFM BREAKOUT BOX
- 3) VARIABLE VOLTAGE POWER SUPPLY
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: 10134-20001

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:

VARIABLE VOLTAGE POWER SUPPLY SHORTS. TWO IFM BOXES FLOWN ON EACH FLIGHT. CREW CAN USE SECOND BREAKOUT BOX FOR REPLACEMENT OF VARIABLE VOLTAGE POWER SUPPLY FUNCTION. CREW CAN USE PIN KIT AND VARIABLE LIGHTING RHEOSTAT AS ANOTHER REPLACEMENT. THIS CREW ACTION REDUCES HARDWARE CRITICALITY BY ONE TO A "3". LOSS OF ALL REDUNDANCY COULD RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: 10134-20001, JSC-17321, IFM BREAKOUT BOX ELECTRICAL SCHEMATIC

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/1R  
MDAC ID: 4313 ABORT: /NA

ITEM: IFM BREAKOUT BOX VARIABLE VOLTAGE POWER SUPPLY  
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) IFM BREAKOUT BOX
- 3) VARIABLE VOLTAGE POWER SUPPLY
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE

PART NUMBER: 10134-20001

CAUSES: PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:

VARIABLE VOLTAGE POWER SUPPLY HAS AN OPEN CIRCUIT. TWO IFM BREAKOUT BOXES FLOWN ON EACH FLIGHT. CREW CAN USE SECOND BREAKOUT BOX FOR REPLACEMENT OF VARIABLE VOLTAGE POWER SUPPLY FUNCTION. CREW CAN USE PIN KIT AND VARIABLE LIGHTING RHEOSTAT AS REPLACEMENT. THIS CREW ACTION REDUCES HARDWARE CRITICALITY BY ONE TO A "3". LOSS OF ALL REDUNDANCY COULD RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: 10134-20001, JSC-17321, IFM BREAKOUT BOX ELECTRICAL SCHEMATIC

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 4314 ABORT: /NA

ITEM: IFM BREAKOUT BOX 28 V/VARIABLE SWITCH (SW2)  
FAILURE MODE: SHORTED

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) IFM BREAKOUT BOX
- 3) 28 V/VARIABLE SWITCH (SW2)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: 10134-20001

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:

SW2 SHORTS. TWO IFM BREAKOUT BOXES FLOWN ON EACH FLIGHT. UNABLE TO OPEN SWITCH AND TURN POWER OFF. CREW CAN USE ORBITER-SIDE POWER OUTLET SWITCH TO OVERCOME LOSS OF SWITCH FUNCTION.

REFERENCES: 10134-20001, JSC-17321, IFM BREAKOUT BOX ELECTRICAL SCHEMATIC

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 4315

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/1R  
ABORT: /NA

ITEM: IFM BREAKOUT BOX 28 V/VARIABLE SWITCH (SW2)  
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) IFM BREAKOUT BOX
- 3) 28 V/VARIABLE SWITCH (SW2)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE

PART NUMBER: 10134-20001

CAUSES: PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:

SW2 HAS AN OPEN CIRCUIT. TWO IFM BREAKOUT BOXES FLOWN ON EACH FLIGHT. CREW CAN USE SECOND BREAKOUT BOX AS REPLACEMENT OR PERFORM IFM TO REPAIR BROKEN SWITCH. CREW CAN ALSO USE PIN KIT AND VARIABLE LIGHTING RHEOSTAT AS REPLACEMENT. THIS CREW ACTION REDUCES CRITICALITY BY ONE TO A "3". LOSS OF ALL REDUNDANCY COULD RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: 10134-20001, JSC-17321, IFM BREAKOUT BOX ELECTRICAL SCHEMATIC

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/1R  
MDAC ID: 4316 ABORT: /NA

ITEM: IFM BREAKOUT BOX AWG OUTPUT SELECT SWITCH (SW4)  
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) IFM BREAKOUT BOX
- 3) AWG OUTPUT SELECT SWITCH (SW4)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: 10134-20001

CAUSES: PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:

SW4 HAS AN OPEN CIRCUIT OR SHORTS IN "OFF" POSITION. TWO IFM BREAKOUT BOXES FLOWN ON EACH FLIGHT. CREW CAN USE SECOND BREAKOUT BOX OR PERFORM IFM ON BROKEN BREAKOUT BOX. CREW CAN ALSO USE PIN KIT AND VARIABLE LIGHTING RHEOSTAT FOR REPLACEMENT FUNCTION. CREW ACTIONS REDUCE HARDWARE CRITICALITY BY ONE TO "3". LOSS OF ALL REDUNDANCY COULD RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: 10134-20001, JSC-17321, IFM BREAKOUT BOX ELECTRICAL SCHEMATIC

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/04/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 4317

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: IFM BREAKOUT BOX AWG OUTPUT SELECT SWITCH (SW4)  
FAILURE MODE: SHORTED

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) IFM BREAKOUT BOX
- 3) OUTPUT SELECT SWITCH (SW4)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE

PART NUMBER: 10134-20001

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:

TWO IFM BREAKOUT BOXES FLOWN ON EACH FLIGHT. SWITCH SHORTS TO ONE OF FOUR AWG PIN SETS. UNABLE TO SWITCH TO DIFFERENT AWG SETTING. CREW CAN USE SW2 OR ORBITER-SIDE POWER OUTLET SWITCH TO TURN POWER OFF. CREW CAN USE SECOND BREAKOUT BOX OR PIN KIT TO PROVIDE REPLACEMENT FUNCTION FOR DIFFERENT AWG SETTING.

REFERENCES: 10134-20001, JSC-17321, IFM BREAKOUT BOX ELECTRICAL SCHEMATIC

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5101 ABORT: /NA

ITEM: GALLEY WATER HEATER CIRCUIT BREAKER  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) WATER HEATER
- 4) CIRCUIT BREAKER
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL ML86B  
PART NUMBER: CB24

CAUSES: OVERLOAD

EFFECTS/RATIONALE:

FAILING THE WATER HEATER CIRCUIT BREAKER OPEN WILL ELIMINATE FIVE OF THE SIX WATER HEATERS. ONE HEATER IS NOT SUFFICIENT TO HEAT THE WATER TO REQUIRED TEMPERATURE. WORST CASE WOULD MEAN ALTERNATE MEANS OF HEATING BEVERAGES WOULD HAVE TO BE FOUND AND THAT IT MAY TAKE LONGER TO HEAT OTHER FOOD IN THE OVEN (ASSUMING REHYDRATION WITH AMBIENT WATER).

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5102 ABORT: /NA

ITEM: GALLEY DC POWER BUS B SWITCH  
FAILURE MODE: FAILS "OFF"

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) DC POWER BUS B SWITCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEQRBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

FAILING THE GALLEY POWER BUS SWITCH "OFF" WILL RESULT IN THE LOSS OF FIVE OF THE SIX WATER HEATERS. ONE HEATER IS NOT SUFFICIENT TO HEAT THE WATER TO THE REQUIRED TEMPERATURES. WORST CASE WOULD REQUIRE ALTERNATE MEANS OF HEATING BEVERAGES.  
ALSO, HEATING FOOD IN THE OVEN MIGHT TAKE LONGER DUE TO REHYDRATION WITH AMBIENT AS OPPOSED TO HEATED WATER.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5103 ABORT: /NA

ITEM: GALLEY DC POWER BUS B SWITCH  
FAILURE MODE: FAILS "ON"

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) DC POWER BUS B SWITCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL

EFFECTS/RATIONALE:

FAILING THE HEATER SWITCH "ON" MEANS THAT WATER WILL ALWAYS BE HEATING. ASSUMING THAT THE THERMOSTATS AND RECIRCULATION PUMP CONTINUE TO WORK PROPERLY, THE FAILURE SHOULD HAVE NO EFFECT ON THE OPERATION OF THE GALLEY.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 5104

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: GALLEY DC POWER BUS B SWITCH  
FAILURE MODE: PARTIAL OUTPUT

LEAD ANALYST: S.K. SINCLAIR

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) DC POWER BUS B SWITCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		HDW/FUNC
	HDW/FUNC	ABORT	
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

CONTAMINATION OF THE SWITCH MEANS THAT A SUBSET OF THE WATER HEATERS WILL ALWAYS BE ON OR ALWAYS OFF (DEPENDING UPON THE CONTAMINATON PATTERN AND SWITCH POSITION). SINCE TOTAL FAILURE OF THE SWITCH DOES NOT PRESENT CRITICAL FAILURES, A PARTIAL FAILURE OF THE SWITCH IS ALSO NOT CRITICAL.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5105 ABORT: /NA

ITEM: POTABLE WATER HEATER TELEMETRY  
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) WATER HEATER STATUS
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER: V62S0706E

CAUSES: ELECTROMAGNETIC FIELDS

EFFECTS/RATIONALE:

ERRONEOUS OUTPUT ON THE TELEMETRY MEANS AN INCORRECT STATUS WILL BE REFLECTED. IT HAS NO AFFECT ON ACTUAL OPERATIONS.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5106 ABORT: /NA

ITEM: RECIRCULATION PUMP  
FAILURE MODE: FAILS TO START

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) HOT WATER SYSTEM
- 4) RECIRCULATION PUMP
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER: P1

CAUSES: CONTAMINATION, LOSS OF INPUT

EFFECTS/RATIONALE:

THE RECIRCULATION PUMP IS A PART OF THE WATER HEATING SYSTEM MIXING HOT AND COLD WATER TO ENSURE EVEN AND EFFICIENT HEATING. FAILURE OF THE PUMP TO START MEANS THE WATER WILL NOT BE HEATED AND ALTERNATE METHODS OF HEATING BEVERAGES/REHYDRATABLE FOOD MUST BE FOUND. ALSO, THERE MAY NOT BE ENOUGH PRESSURE TO DISPENSE HOT WATER TO THE REHYDRATION STATION.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5107 ABORT: /NA

ITEM: RECIRCULATION PUMP  
FAILURE MODE: FAILS TO STOP

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) HOT WATER SYSTEM
- 4) RECIRCULATION PUMP
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY  
PART NUMBER: P1

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

THE RECIRCULATION PUMP IS DESIGNED TO OPERATE WHEN THE WATER TEMPERATURE IS BETWEEN 145 DEGREES AND 165 DEGREES F, AND AS HOT WATER IS DISPENSED. THE PUMP REMAINS RUNNING AT OTHER THAN DESIRED TEMPERATURES, AN INCREASE IN HEATER DUTY CYCLES COULD OCCUR.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5108 ABORT: /NA

ITEM: RECIRCULATION THERMOSTAT  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) HOT WATER SYSTEM
- 4) RECIRCULATION PUMP
- 5) THERMOSTAT
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

FAILURE OF THE RECIRCULATION PUMP THERMOSTAT TO OPEN WILL CAUSE THE RECIRCULATION PUMP TO CONTINUE RUNNING AT HIGHER THAN DESIRED TEMPERATURE. THIS WILL RESULT IN INEFFICIENT HEATING OF THE WATER AND INCREASED HEATER DUTY CYCLES.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5109 ABORT: /NA

ITEM: RECIRCULATION THERMOSTAT  
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) HOT WATER SYSTEM
- 4) RECIRCULATION PUMP
- 5) THERMOSTAT
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL, LOSS OF INPUT

EFFECTS/RATIONALE:

FAILURE OF THE RECIRCULATION PUMP THERMOSTAT TO CLOSE MEANS THE PUMP WILL NOT TURN ON TO RECIRCULATE WATER. THIS MEANS THE WATER HEATING CANNOT BE GUARANTEED AND ALTERNATE METHODS MUST BE USED.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 5110

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/2R  
ABORT: /NA

ITEM: HOT WATER TANK  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR      SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) HOT WATER SYSTEM
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ]      B [ P ]      C [ P ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: MISHANDLING/ABUSE, PIECE-PART STRUCTURAL

EFFECTS/RATIONALE:

STRUCTURAL FAILURE OF THE HOT WATER TANK WILL RESULT IN FREE WATER IN THE CABIN AND ONLY CHILLED WATER REMAINING THRU THE GALLEY. WATER CAN BE OBTAINED THRU THE EMERGENCY WATER DISPENSER ASSEMBLY. THE MISSION CAN BE AFFECTED IF REDUNDANT MEANS OF CONTAINING WATER (i.e. SHUT OFF VALVES) FAIL. WITH THE ADDITION OF THE ACCUMULATOR THIS FAILURE IS UNLIKELY.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5111 ABORT: /NA

ITEM: WATER TANK HEATERS  
FAILURE MODE: FAIL OFF

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) HOT WATER SYSTEM
- 4) HEATER
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: PIECE-PART FAILURE, LOSS OF INPUT

EFFECTS/RATIONALE:

LOSS OF THE WATER TANK HEATERS MEANS THAT ALTERNATE MEANS OF HEATING BEVERAGES/REHYDRATABLE FOOD MUST BE FOUND.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 5112

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: WATER TANK HEATERS  
FAILURE MODE: FAIL ON

LEAD ANALYST: S.K. SINCLAIR                  SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) HOT WATER SYSTEM
- 4) HEATER
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ]                  B [ ]                  C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: ERRONEOUS INPUT, LOSS OF INPUT

EFFECTS/RATIONALE:

FAILING ALL THE WATER TANK HEATERS "ON" WILL RESULT IN CONTINUOUS HEAT BEING APPLIED TO THE WATER/TANK AND POSSIBLE OVERPRESSURIZATION OF THE TANK. IF JUST ONE HEATER FAILS "ON", THE REQUIRED CYCLING OF THE HEATERS CAN BE ACCOMPLISHED BY THE REMAINING HEATERS. THE ADDITION OF THE ACCUMULATOR WILL PREVENT DAMAGE IN THE CASE OF OVERPRESSURIZATION.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5113 ABORT: /NA

ITEM: WATER TANK HEATER THERMOSTAT  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) HOT WATER SYSTEM
- 4) HEATER
- 5) THERMOSTAT
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

FAILURE OF THE THERMOSTAT TO OPEN WILL HAVE THE SAME EFFECT AS A HEATER FAILING ON. EACH HEATER HAS TWO REDUNDANT THERMOSTATS SO THAT BOTH THERMOSTATS MUST FAIL TO OPEN FOR THE HEATER TO REMAIN ON. A SERIES OF TWELVE THERMOSTATS MUST FAIL TO HAVE ALL SIX HEATERS REMAINING ON.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5114 ABORT: /NA

ITEM: WATER TANK HEATER THERMOSTAT  
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) HOT WATER SYSTEM
- 4) HEATER
- 5) THERMOSTAT
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL

EFFECTS/RATIONALE:  
A THERMOSTAT FAILING TO CLOSE WILL HAVE THE SAME EFFECT AS A  
HEATER FAILING OFF.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5115 ABORT: /NA

ITEM: HOT WATER TEMPERATURE GAUGE  
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) HOT WATER TEMPERATURE GAUGE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

ERRONEOUS DISPLAY OF THE WATER TEMPERATURE MEANS THE CREW WILL THINK THE HOT WATER IS A DIFFERENT TEMPERATURE THAN IT ACTUALLY IS. ALL OPERATIONS WILL CONTINUE AND THE ACTUAL WATER TEMPERATURE CAN BE DETERMINED BY SAMPLING THE WATER OUTLET.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5116 ABORT: /NA

ITEM: GALLEY OVEN CIRCUIT BREAKER  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN
- 4) CIRCUIT BREAKER
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL ML86B

PART NUMBER: CB20

CAUSES:

EFFECTS/RATIONALE:

THE GALLEY OVEN CIRCUIT BREAKER PROVIDES POWER TO THE OVEN HEATERS AND TO THE GALLEY CONTROL ELECTRONICS. ALL FUNCTIONS OF THE GALLEY ARE LOST DUE TO THE ELECTRONICS FAILURE. WATER WILL STILL BE AVAILABLE THRU THE CONTINGENCY WATER DISPENSER.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5117 ABORT: /NA

ITEM: GALLEY DC POWER BUS A SWITCH  
FAILURE MODE: FAILS "OFF"

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) DC POWER BUS A SWITCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

JAMMING THE GALLEY POWER BUS IN THE "OFF" POSITION WILL PREVENT POWER FROM REACHING THE OVEN HEATERS AND THE GALLEY CONTROL ELECTRONICS. THE CONTROL ELECTRONICS ELIMINATE ALL GALLEY FUNCTIONS - LEAVING WATER TO BE OBTAINED THROUGH THE CWDA.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/04/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5118 ABORT: /NA

ITEM: GALLEY DC POWER BUS A SWITCH  
FAILURE MODE: FAILS "ON"

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) DC POWER BUS A SWITCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

FAILING THE SWITCH "ON" SIMPLY MEANS POWER WILL CONTINUOUSLY BE APPLIED TO THE OVEN HEATERS AND CONTROL. THE THERMOSTATS SHOULD CONTINUE TO CYCLE TO MAINTAIN TEMPERATURE CONTROL.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5119 ABORT: /NA

ITEM: GALLEY DC POWER BUS A SWITCH  
FAILURE MODE: PARTIAL OUTPUT

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) DC POWER BUS A SWITCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

SINCE THERE ARE 3 SETS OF CONTACTS, THIS FAILURE COULD HAVE VARYING RESULTS. IT COULD MEAN LOSS OF POWER TO: 1) ONE OF SIX HEATERS IN THE WATER HEATER WHICH WOULD NOT ADVERSELY EFFECT NORMAL OPERATIONS, HOWEVER WOULD INDICATE LOSS OF POWER TO THE GALLEY VIA TELEMETRY, 2) TO THE HEATER COILS, WHICH WOULD ELIMINATE THE USE OF THE OVEN, 3) TO THE CONTROL ELECTRONICS WHICH WOULD ELIMINATE USE OF THE ENTIRE GALLEY. WATER WOULD STILL BE AVAILABLE TO THE CREW.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5120 ABORT: /NA

ITEM: FOOD OVEN TELEMETRY  
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) FOOD OVEN STATUS
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER: V62S0702E

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

WILL GIVE AN INCORRECT INDICATION OF WHETHER THE OVEN IS "ON" BUT  
WILL HAVE NO EFFECT ON THE ACTUAL OPERATION.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5121 ABORT: /NA

ITEM: GALLEY FAN CIRCUIT BREAKERS  
FAILURE MODE: FAIL OPEN

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) FAN
- 4) CIRCUIT BREAKERS
- 5)
- 6)
- 7)
- 8)
- 9)

		CRITICALITIES		
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC	
PRELAUNCH:	/NA	RTLS:	/NA	
LIFTOFF:	/NA	TAL:	/NA	
ONORBIT:	3/3	AOA:	/NA	
DEORBIT:	/NA	ATO:	/NA	
LANDING/SAFING:	/NA			

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: PANEL MA73C

PART NUMBER: PHASE A - CB26; PHASE B - CB27; PHASE C - CB28

CAUSES: OVERLOAD

EFFECTS/RATIONALE:

THIS FAILURE WOULD RESULT IN LOSS OF THE FANS WHICH CIRCULATE AIR IN THE OVEN FOR EVEN HEATING. OVEN PERFORMANCE WOULD BE DEGRADED AND COULD EFFECTIVELY ELIMINATE THE USE OF THE OVEN FOR CONVECTIVE HEATING.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5122 ABORT: /NA

ITEM: GALLEY OVEN FAN SWITCH  
FAILURE MODE: FAILS "ON"

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN FAN SWITCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

THIS FAILURE WOULD RESULT IN LOSS OF THE FANS WHICH CIRCULATE AIR IN THE OVEN FOR EVEN HEATING. OVEN PERFORMANCE WOULD BE DEGRADED. THIS FAILURE COULD EFFECTIVELY ELIMINATE THE USE OF THE OVEN FOR CONVECTION HEATING.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5123 ABORT: /NA

ITEM: GALLEY OVEN FAN SWITCH  
FAILURE MODE: FAILS "ON"

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN FAN SWITCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL

EFFECTS/RATIONALE:

THIS FAILURE WOULD RESULT IN CONTINUOUS OPERATION OF THE FANS.  
THIS WOULD HAVE NO ADVERSE EFFECT ON THE OPERATION OF THE OVEN.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5124 ABORT: /NA

ITEM: OVEN FAN - MOTOR  
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN
- 4) FAN MOTOR
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY OVEN

PART NUMBER:

CAUSES: PIECE-PART STRUCTURAL

EFFECTS/RATIONALE:

LOSS OF ONE OF 3 FANS WOULD HAVE MINIMAL EFFECT ON THE PERFORMANCE OF THE OVEN.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5125 ABORT: /NA

ITEM: OVEN FAN - MOTOR  
FAILURE MODE: OPEN (ELECTRICAL)

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN
- 4) FAN MOTOR
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY OVEN  
PART NUMBER:

CAUSES: MECHANICAL SHOCK

EFFECTS/RATIONALE:

THIS WOULD RESULT IN LOSS OF ONE OF 3 FANS. THIS WOULD HAVE A MINIMAL EFFECT ON THE PERFORMANCE OF THE OVEN.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5126 ABORT: /NA

ITEM: OVEN FAN - MOTOR  
FAILURE MODE: SHORTED

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN
- 4) FAN MOTOR
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY OVEN

PART NUMBER:

CAUSES: CONTAMINATION, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

THIS WILL RESULT IN IMMEDIATE LOSS OF 1 OF 3 OVEN FANS, AND WILL PROBABLY TRIP THE BREAKERS WHICH WILL SHUT DOWN THE OTHER 2 FANS RESULTING IN LOSS OF CONVECTION HEATING IN THE OVEN.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5127 ABORT: /NA

ITEM: OVEN FAN  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN
- 4) FAN
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:

LOSS OF ONE OF 3 FANS WILL HAVE MINIMAL EFFECT ON THE PERFORMANCE OF THE OVEN.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5128 ABORT: /NA

ITEM: OVEN THERMOSTAT  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN
- 4) THERMOSTAT
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY OVEN

PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

THERE ARE REDUNDANT THERMOSTATS IN EACH OF THE 4 HEATING ELEMENTS IN THE OVEN. FAILURE OF ONE WILL NOT EFFECT THE PERFORMANCE OF THE OVEN.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5129 ABORT: /NA

ITEM: OVEN THERMOSTAT  
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN
- 4) THERMOSTAT
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY OVEN  
PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL, LOSS OF INPUT

EFFECTS/RATIONALE:

THIS FAILURE WILL RESULT IN LOSS OF 1 OF 4 HEATING ELEMENTS IN THE OVEN. THIS WILL INCREASE THE DUTY CYCLES OF THE OTHER 3 ELEMENTS AND COULD RESULT IN MORE TIME REQUIRED TO HEAT FOOD.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5130 ABORT: /NA

ITEM: OVEN HEATER  
FAILURE MODE: FAILS OFF

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN
- 4) HEATER
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY OVEN

PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE,  
PIECE-PART STRUCTURAL

EFFECTS/RATIONALE:

LOSS OF A SINGLE HEATING ELEMENT WILL RESULT IN LESS EFFICIENT  
OVEN PERFORMANCE AND INCREASED DUTY CYCLE OF OTHER 3 ELEMENTS.  
LOSS OF ALL HEATING ELEMENTS ELIMINATES USE OF THE OVEN FOR  
HEATING FOOD.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5131 ABORT: 3/3

ITEM: OVEN DOOR LAUNCH/ENTRY RESTRAINING STRAP  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN DOOR
- 4) LAUNCH/ENTRY RESTRAINING STRAP
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/3
LIFTOFF:	3/3	TAL:	3/3
ONORBIT:	/NA	AOA:	3/3
DEORBIT:	3/3	ATO:	3/3
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: PIECE-PART FAILURE, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE OF THE LAUNCH/ENTRY RESTRAINING STRAP CAN RESULT IN THE OVEN DOOR SWINGING OPEN DURING LAUNCH AND POSSIBLE DAMAGE TO THE DOOR. IF THE DAMAGE IS SEVERE ENOUGH, IT WILL ADVERSELY EFFECT THE PERFORMANCE OF THE OVEN. THE CREW CAN SECURE THE DOOR FOR REENTRY WITH TAPE.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5132 ABORT: /NA

ITEM: OVEN DOOR  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN DOOR
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY OVEN

PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

EXTENT OF DAMAGE WILL DETERMINE THE EFFECT ON THE PERFORMANCE OF THE OVEN. IF THE DOOR CANNOT BE USED AT ALL IT WILL ELIMINATE THE USE OF THE OVEN FOR HEATING FOOD.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5133 ABORT: /NA

ITEM: OVEN DOOR  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN DOOR
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY OVEN

PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

IF THE DOOR CANNOT BE CLOSED IT WILL ELIMINATE USE OF THE OVEN FOR HEATING FOOD.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5134 ABORT: /NA

ITEM: OVEN DOOR LATCH  
FAILURE MODE: FAILS TO RELEASE

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN DOOR
- 4) LATCH
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY OVEN

PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

HAND TOOLS ON-BOARD CAN BE USED TO FORCE THE SPRING LATCHES OPEN  
IF THE LATCH PUSH MECHANISM FAILS.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5135 ABORT: /NA

ITEM: OVEN DOOR LATCH  
FAILURE MODE: FAILS TO LATCH

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN DOOR
- 4) LATCH
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY OVEN  
PART NUMBER:

CAUSES: PIECE-PART FAILURE

EFFECTS/RATIONALE:  
DOOR CAN BE TAPE SHUT IF LATCH WILL NOT WORK.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5136 ABORT: /NA

ITEM: OVEN DOOR TRACK  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN DOOR
- 4) DOOR TRACK
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY OVEN

PART NUMBER:

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

IF DOOR CANNOT BE STORED IN TRACK IT WILL HAVE LITTLE EFFECT AS LONG AS THE DOOR CAN BE OPENED. IF FAILURE PREVENTS THE DOOR FROM BEING USED TO CLOSE THE OVEN IT WILL ELIMINATE THE USE OF THE OVEN.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5137 ABORT: /NA

ITEM: OVEN DOOR TRACK  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN DOOR
- 4) DOOR TRACK
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY OVEN

PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

THE TRACK IS NOT NECESSARY TO THE OPERATION OF THE OVEN, HOWEVER IF IT PREVENTS THE DOOR FROM BEING USED TO CLOSE THE OVEN, IT WILL ELIMINATE THE USE OF THE OVEN.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5138 ABORT: /NA

ITEM: OVEN GASKET  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN
- 4) GASKET
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY OVEN

PART NUMBER:

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

THIS FAILURE WILL PREVENT THE OVEN DOOR FROM SEALING AND REDUCE THE PERFORMANCE OF THE OVEN. IT WILL TAKE LONGER TO HEAT FOOD.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5139 ABORT: /NA

ITEM: OVEN SHELF ASSEMBLY - UPPER RACK  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN
- 4) UPPER RACK SHELF ASSEMBLY
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY OVEN

PART NUMBER:

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

DAMAGE TO THIS RACK CAN EFFECT THE PLACEMENT OF FOOD PACKETS IN THE OVEN AND RESTRICT CIRCULATION. THIS COULD CAUSE UNEVEN HEATING OF THE FOOD.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5140 ABORT: /NA

ITEM: LOWER SHELF ASSEMBLY  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN
- 4) LOWER SHELF ASSEMBLY
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY OVEN

PART NUMBER:

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

DAMAGE TO THE SHELF CAN EFFECT PLACEMENT OF PACKETS IN THE OVEN AND RESTRICT CIRCULATION. THIS CAN CAUSE UNEVEN HEATING OF THE FOOD.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5141 ABORT: /NA

ITEM: LOWER TRACKS  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN
- 4) LOWER TRACKS
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY OVEN  
PART NUMBER:

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

DAMAGE TO THE RACK CAN EFFECT PLACEMENT OF THE FOOD PACKETS IN THE OVEN AND RESTRICT CIRCULATION. THIS CAN CAUSE UNEVEN HEATING OF THE FOOD.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5142 ABORT: /NA

ITEM: OVEN SCREEN  
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN
- 4) SCREEN
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY OVEN

PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART FAILURE, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

DEBRIS FILTER PROTECTS THE REST OF OVEN IN CASE OF PACKAGE BREAKAGE. RESTRICTED CIRCULATION WILL CAUSE UNEVEN HEATING OF FOOD. THIS PROBLEM CAN BE FIXED BY CLEANING THE SCREEN.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5143 ABORT: /NA

ITEM: OVEN SCREEN  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN
- 4) SCREEN
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY OVEN

PART NUMBER:

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

SEVERELY BENT SCREEN COULD IMPINGE ON ONE OR MORE FANS WHICH WOULD LIMIT AIR CIRCULATION IN THE OVEN. A LARGE HOLE IN THE SCREEN WOULD PERMIT ANY CONTAMINANTS TO CIRCULATE IN THE OVEN AND POSSIBLY DAMAGE THE FANS.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 5144

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: SPRING LOADED PLATE  
FAILURE MODE: FAILS MID-TRAVEL

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN
- 4) SPRING LOADED PLATE(S)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY OVEN

PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE,  
STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE OF SPRING LOADED PLATE WOULD MEAN PARTIAL LOSS OF CONDUCTIVE HEATING FOR HEATING FOOD IN THE OVEN. THERE ARE 4 SPRING LOADED PLATES. REHYDRATED FOODS COULD STILL BE HEATED WITH CONVECTIVE HEAT IN THE LOWER RACK.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5145 ABORT: /NA

ITEM: OVEN SPRING CLIP  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN
- 4) SPRING PLATE
- 5) RETAINING CLIP
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY OVEN  
PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE,  
STRUCTURAL FAILURE

EFFECTS/RATIONALE:

FAILURE OF THE RETAINING CLIP WILL HAVE NO ADVERSE EFFECT ON THE  
PERFORMANCE OF THE OVEN, EVEN THOUGH IT MIGHT MAKE IT MORE  
DIFFICULT FOR THE CREW TO LOAD FOOD POUCHES ONTO THE SPRING  
PLATES.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5146 ABORT: /NA

ITEM: OVEN FINNED PLATE HEAT SINK  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) OVEN
- 4) FINNED PLATE HEAT SINK
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY OVEN

PART NUMBER:

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

BLOCKS AIR FLOW - CONVECTIVE HEATING OF FOOD IN OVEN IS REDUCED -  
IT WILL TAKE LONGER TO HEAT FOOD.

REFERENCES: JSC-12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5147 ABORT: /NA

ITEM: GALLEY CONTROL ELECTRONICS  
FAILURE MODE: ERRONEOUS OUTPUT

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) RHS
- 4) CONTROL ELECTRONICS
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:

COULD RESULT IN INCORRECT VOLUME OF WATER BEING DISPENSED AT REHYDRATION STATION OR PHS; OR COMPLETE LOSS OF GALLEY WATER SYSTEM. WATER WOULD STILL BE AVAILABLE TO CREW THRU THE AUXILIARY PORT.

REFERENCES: JSC-12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5148 ABORT: /NA

ITEM: WATER QUANTITY SELECTOR SWITCH  
FAILURE MODE: JAMS IN ONE POSITION

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) WATER QUANTITY SELECTOR SWITCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

THIS FAILURE MEANS THAT THE CREW WILL NOT BE ABLE TO SELECT THE AMOUNT OF WATER TO BE DISPENSED, AND WILL HAVE TO SETTLE FOR THE AMOUNT INDICATED BY THE SELECTOR. THIS MAY AFFECT THE CONSISTENCY OR TASTE OF THE FOOD.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5149 ABORT: /NA

ITEM: WATER QUANTITY SELECTOR SWITCH  
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) WATER QUANTITY SELECTOR SWITCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION, LOSS OF INPUT

EFFECTS/RATIONALE:

THIS FAILURE WILL ELIMINATE AN ACCURATE MEASURE OF WATER TO THE REHYDRATION STATION FOR ADDING WATER TO FOOD PACKAGES. ALTERNATE METHODS WILL HAVE TO BE USED.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5150 ABORT: /NA

ITEM: WATER QUANTITY SELECTOR SWITCH  
FAILURE MODE: MULTIPLE OUTPUTS

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) WATER QUANTITY SELECTOR SWITCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

THIS FAILURE MEANS AN INCORRECT VOLUME OF WATER MAY BE ADDED TO FOOD WHICH WILL EFFECT ITS CONSISTENCY AND TASTE. WORST CASE - TOO MUCH WATER MAY BE ADDED TO PACKAGE RESULTING IN WATER LEAKAGE.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5151 ABORT: /NA

ITEM: REHYDRATION PUMP  
FAILURE MODE: FAILS "ON"

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) REHYDRATION STATION PUMP (P2)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER: P2

CAUSES: CONTAMINATION, ERRONEOUS INPUT

EFFECTS/RATIONALE:

CONTINUOUS RUNNING OF THE PUMP SHOULD NOT EFFECT THE OPERATION OF THE REHYDRATION STATION, HOWEVER IT MAY SHORTEN THE LIFE OF THE PUMP. THIS PUMP IS NOW USED TO RECIRCULATE COLD WATER BACK TO AMBIENT - IF THE COLD WATER CONTINUES TO CIRCULATE, IT COULD EFFECT THE EFFICIENCY OF THE HEATING COILS IN THE HOT WATER LOOP SINCE THEY WILL HAVE TO HEAT COLD WATER INSTEAD OF AMBIENT.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5152 ABORT: /NA

ITEM: REHYDRATION PUMP  
FAILURE MODE: FAILS "OFF"

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) REHYDRATION STATION PUMP
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER: P2

CAUSES: OVERLOAD, LOSS OF INPUT

EFFECTS/RATIONALE:

WITH THE PUMP OFF THERE MAY NOT BE ADEQUATE PRESSURE IN THE LINE TO PROPERLY REHYDRATE THE FOOD PACKAGES WITH COLD WATER. HOT WATER WILL STILL BE AVAILABLE TO REHYDRATE THE FOOD. ALSO, COLD WATER WILL NOT BE RECIRCULATED, SO THE COLD WATER LOOP WILL WARM UP.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5153 ABORT: /NA

ITEM: RHS LEVER ARM CONTROL  
FAILURE MODE: FAILS CLOSED

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) RHS
- 4) LEVER ARM CONTROL
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: MISHANDLING/ABUSE, PIECE-PART STRUCTURAL

EFFECTS/RATIONALE:

ACTIVATES INTERLOCK SWITCH. SWITCH MUST ALSO BE OPENED BETWEEN EACH SUCCESSIVE WATER DISPENSING. IF FAILURE PREVENTS SWITCH FROM CYCLING, THE REHYDRATION STATION WILL NOT DISPENSE WATER. ALTERNATE MEANS WILL HAVE TO BE USED TO REHYDRATE FOOD.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5154 ABORT: /NA

ITEM: RHS LEVER ARM CONTROL  
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) RHS
- 4) LEVER ARM CONTROL
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: MISHANDLING/ABUSE, PIECE-PART STRUCTURAL

EFFECTS/RATIONALE:

THIS FAILURE WILL PREVENT ACTIVATION OF THE INTERLOCK SWITCH AND THE HYDRATION STATION WILL NOT DISPENSE WATER. ALTERNATE MEANS WILL HAVE TO BE USED TO REHYDRATE FOOD.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5155 ABORT: /NA

ITEM: REHYDRATION STATION SWITCH  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) REHYDRATION SYSTEM
- 4) INTERLOCK SWITCH
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

THE REHYDRATION SWITCH IS AN INTEGRAL INTERLOCK SWITCH WHICH CLOSES WHEN THE FOOD PACKET IS CORRECTLY INSERTED. IF IT DOES NOT CYCLE TO "CLOSED" AND BACK TO "OPEN" WATER WILL NOT BE DISPENSED. ALTERNATE MEANS WILL BE REQUIRED TO REHYDRATE FOOD.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5156 ABORT: /NA

ITEM: REHYDRATION STATION SWITCH  
FAILURE MODE: FAILS CLOSED

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) REHYDRATION SYSTEM
- 4) INTERLOCK SWITCH
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

THE REHYDRATION STATION WILL NOT DISPENSE WATER IF THIS SWITCH IS CLOSED. ALTERNATE MEANS WILL HAVE TO BE USED TO REHYDRATE FOOD.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5157 ABORT: /NA

ITEM: COLD WATER FILL PUSH BUTTON SWITCH  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) COLD WATER FILL SYSTEM
- 4) PUSH BUTTON SWITCH
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART STRUCTURAL

EFFECTS/RATIONALE:

IF THIS SWITCH FAILS OPEN, THE REHYDRATION STATION CANNOT DISPENSE COLD WATER. HOT WATER WILL NOT BE EFFECTED.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 5158

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: COLD WATER FILL PUSH BUTTON SWITCH  
FAILURE MODE: FAILS CLOSED

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) COLD WATER FILL SYSTEM
- 4) PUSH BUTTON SWITCH
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:

IF THIS SWITCH FAILS CLOSED, THE SOLENOID VALVE ON THE CHILLED WATER WILL REMAIN OPEN ALL THE TIME. THE CREW WILL NOT BE ABLE TO REGULATE THE WATER TEMPERATURE AT THE REHYDRATION STATION.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5159 ABORT: /NA

ITEM: COLD WATER FILL SWITCH - LIGHT  
FAILURE MODE: FAILS ON

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) COLD WATER FILL SYSTEM
- 4) INDICATOR LIGHT
- 5)
- 6)
- 7)
- 8)
- 9)

FLIGHT PHASE	CRITICALITIES		
	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

THIS FAILURE WILL HAVE NO EFFECT ON THE ACTUAL PERFORMANCE OF THE SYSTEM, HOWEVER IT WILL INCORRECTLY INDICATE THAT THE COLD WATER VALVE IS STUCK OPEN.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5160 ABORT: /NA

ITEM: COLD WATER FILL SWITCH - LIGHT  
FAILURE MODE: FAILS OFF

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) COLD WATER FILL SYSTEM
- 4) INDICATOR LIGHT
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: PIECE-PART

EFFECTS/RATIONALE:

THIS FAILURE WILL HAVE NO EFFECT ON THE ACTUAL PERFORMANCE OF THE SYSTEM, HOWEVER, IT WILL INCORRECTLY INDICATE THAT COLD WATER IS NOT AVAILABLE AT THE REHYDRATION STATION.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5161 ABORT: /NA

ITEM: RHS CHILLED WATER FEED SOLENOID/VALVE  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) RHS WATER SUPPLY SYSTEM
- 4) CHILLED WATER FEED SOLENOID/VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY  
PART NUMBER: SV4

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL

EFFECTS/RATIONALE:

COLD WATER WILL NOT BE AVAILABLE AT THE REHYDRATION STATION.  
THIS WILL HAVE NO EFFECT ON THE HOT WATER.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5162 ABORT: /NA

ITEM: RHS CHILLED WATER FEED SOLENOID/VALVE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) RHS WATER SUPPLY SYSTEM
- 4) CHILLED WATER FEED SOLENOID/VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER: SV4

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

THIS FAILURE MEANS THAT CHILLED WATER CANNOT BE ELIMINATED FROM THE DISPENSER AT THE REHYDRATION STATION. THE CREW CAN STILL SELECT HOT WATER, BUT WILL GET A MIXTURE.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5163 ABORT: /NA

ITEM: RHS OUTLET SOLENOID VALVE  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) RHS WATER SUPPLY
- 4) OUTLET SOLENOID/VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY  
PART NUMBER: SV3

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL

EFFECTS/RATIONALE:

THIS FAILURE WILL PREVENT HOT WATER FROM BEING DISPENSED AT THE REHYDRATION STATION. COLD WATER WILL STILL BE AVAILABLE.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5164 ABORT: /NA

ITEM: RHS OUTLET SOLENOID VALVE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) RHS WATER SUPPLY
- 4) OUTLET SOLENOID/VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER: SV3

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

THIS FAILURE COULD RESULT IN SOME LEAKAGE. HOWEVER, THE WATER CAN BE SHUT OFF UPSTREAM USING THE HOT WATER SOLENOID VALVE AND THE COLD WATER SOLENOID VALVE.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5165 ABORT: /NA

ITEM: RHS BYPASS SOLENOID VALVE  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) RHS WATER SUPPLY
- 4) BYPASS SOLENOID VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY  
PART NUMBER: SV2

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

WILL NOT BE ABLE TO SUPPLY WATER BY BY-PASSING THE ELECTRONIC FILLING MECHANISM. IF THE ELECTRONIC MECHANISM HAS ALSO FAILED, AN ALTERNATE METHOD OF REHYDRATING FOOD WILL BE REQUIRED.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5166 ABORT: /NA

ITEM: RHS BYPASS SOLENOID VALVE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) RHS WATER SUPPLY
- 4) BYPASS SOLENOID VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER: SV2

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL

EFFECTS/RATIONALE:

WATER WILL CONTINUOUSLY BY-PASS THE ELECTRONIC FILLING MECHANISM AND WATER HEATER. THIS WILL AFFECT THE TEMPERATURE OF THE HOT WATER BEING DISPENSED.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5167 ABORT: /NA

ITEM: HOT WATER FILL PUSH BUTTON SWITCH  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) HOT WATER FILL SWITCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART STRUCTURAL

EFFECTS/RATIONALE:

IF THIS SWITCH FAILS OPEN, THE REHYDRATION STATION CANNOT DISPENSE HOT WATER. THE COLD WATER WILL NOT BE EFFECTED.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5168 ABORT: /NA

ITEM: HOT WATER FILL PUSH BUTTON SWITCH  
FAILURE MODE: FAILS CLOSED

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) HOT WATER FILL SWITCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION, MECHANICAL SHOCK

EFFECTS/RATIONALE:

IF THIS SWITCH FAILS CLOSED, THE HOT WATER SOLENOID VALVE WILL REMAIN OPEN CONTINUOUSLY. THE HOT WATER LOOP WILL HAVE TO BE CLOSED TO PREVENT LEAKAGE. COLD WATER WILL STILL BE AVAILABLE AT THE REHYDRATION STATION.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5169 ABORT: /NA

ITEM: HOT WATER FILL SWITCH - LIGHT  
FAILURE MODE: FAILS ON

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) HOT WATER FILL SYSTEM
- 4) INDICATOR LIGHT
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

THIS FAILURE WILL HAVE NO EFFECT ON THE ACTUAL PERFORMANCE OF THE SYSTEM, HOWEVER, IT WILL INCORRECTLY INDICATE THAT THE HOT WATER VALVE IS STUCK OPEN.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 5170

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: HOT WATER FILL SWITCH - LIGHT  
FAILURE MODE: FAILS OFF

LEAD ANALYST: B. RICHARD

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) HOT WATER FILL SYSTEM
- 4) INDICATOR LIGHT
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: PIECE-PART STRUCTURAL, BURNS OUT

EFFECTS/RATIONALE:

THIS FAILURE WILL HAVE NO EFFECT ON THE ACTUAL PERFORMANCE OF THE SYSTEM, HOWEVER, IT WILL INCORRECTLY INDICATE THAT HOT WATER IS NOT AVAILABLE AT THE REHYDRATION STATION.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5171 ABORT: /NA

ITEM: COLD WATER RECIRCULATION SOLENOID/VALVE  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY EPD&C
- 3) RHS WATER SUPPLY
- 4) HOT WATER FEED SOLENOID/VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER: SV1

CAUSES: CONTAMINATION, PIECE-PART STRUCTURAL

EFFECTS/RATIONALE:

COLD WATER WILL NOT BE RECIRCULATED WHICH WILL ALLOW THE WATER IN THE LINE TO WARM UP BETWEEN DISPENSING CYCLES.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 5172

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: COLD WATER RECIRCULATION SOLENOID/VALVE  
FAILURE MODE: FAILS OPEN

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) RHS WATER SUPPLY
- 4) HOT WATER FEED SOLENOID/VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER: SV1

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

THIS MEANS THAT COLD WATER WILL BE CONTINUOUSLY RECYCLED.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 5173

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: RHS NEEDLE  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) REHYDRATION SYSTEM
- 4) NEEDLE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY  
PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

PLUGGED NEEDLE WILL PREVENT DISPENSING WATER AT THE REHYDRATION STATION. SPARE NEEDLES ARE ALWAYS FLOWN AND EASILY CHANGED OUT BY CREWMEN.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5174 ABORT: /NA

ITEM: RHS CUP RETAINER  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) RHS
- 4) CUP RETAINER
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART  
STRUCTURAL

EFFECTS/RATIONALE:

IF THE CUP RETAINER IS DAMAGED SO THAT FOOD PACKAGES CANNOT BE  
INSTALLED IN IT, THE REHYDRATION STATION WILL BE UNUSABLE AND  
ALTERNATE METHODS OF REHYDRATING FOOD WILL HAVE TO BE USED.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5175 ABORT: /NA

ITEM: RHS CUP RETAINER PARALLEL RODS  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) RHS
- 4) CUP RETAINER
- 5) PARALLEL RODS
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: MISHANDLING/ABUSE, PIECE-PART STRUCTURAL

EFFECTS/RATIONALE:

THIS FAILURE WOULD HAVE LITTLE EFFECT ON THE ACTUAL OPERATION OF THE REHYDRATION STATION, HOWEVER IT WOULD MAKE IT MORE DIFFICULT FOR CREWMEN TO ALIGN THE FOOD PACKAGES WITH THE REHYDRATION NEEDLE.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5176 ABORT: /NA

ITEM: RHS CUP RETAINER PARALLEL RODS  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) RHS
- 4) CUP RETAINER
- 5) PARALLEL RODS
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART  
STRUCTURAL

EFFECTS/RATIONALE:  
THIS FAILURE COULD PREVENT INSERTION OF THE NEEDLE INTO THE FOOD  
PACKAGES RENDERING THE REHYDRATION STATION UNUSABLE. ALTERNATE  
METHODS OF REHYDRATION WOULD HAVE TO BE USED.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5177 ABORT: /NA

ITEM: RHS "TRANSPARENT CHAMBER"  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) RHS
- 4) TRANSPARENT CHAMBER
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION:

PART NUMBER:

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

A CRACKED CHAMBER COULD ALLOW SOME WATER LEAKAGE IF FREE WATER RESULTS FROM THE REHYDRATION PROCEDURE.

REFERENCES: JSC 12770

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5178 ABORT: /NA

ITEM: INLET WATER CONNECTIONS  
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) WATER SUPPLY
- 4) CONNECTIONS
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

THIS FAILURE COULD RESULT IN INADEQUATE WATER SUPPLY TO THE GALLEY. IF THE CHILLED WATER CONNECTOR WAS PLUGGED, THERE WOULD BE NO COLD WATER.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 5179 ABORT: /NA

ITEM: INLET WATER CONNECTIONS  
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) WATER SUPPLY
- 4) INLET CONNECTIONS
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: MECHANICAL SHOCK, PIECE-PART

EFFECTS/RATIONALE:

WATER LEAKAGE AT THE CONNECTION OF THE GALLEY TO THE WATER SUPPLY LINES WILL RESULT IN FREE WATER IN THE CABIN. THE WATER CAN BE SHUT-OFF UPSTREAM OF THE CONNECTIONS, BUT IT WILL MEAN NO WATER WILL BE AVAILABLE TO THE GALLEY. IF ALTERNATE WATER SUPPLIES ARE NOT AVAILABLE TO THE CREW, THE MISSION MAY HAVE TO BE TERMINATED.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 5180

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/2R  
ABORT: /NA

ITEM: MANUAL SHUT OFF VALVE  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: B. RICHARD

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) WATER SUPPLY
- 4) MANUAL SHUT OFF VALVE
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ]      B [ P ]      C [ P ]

LOCATION: GALLEY

PART NUMBER: MV3

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART STRUCTURAL

EFFECTS/RATIONALE:

THIS VALVE SHUTS OFF AMBIENT WATER TO THE GALLEY IF THE GALLEY WATER SYSTEM LEAKS HOT WATER ON ORBIT. IF THE VALVE CANNOT BE CLOSED THE SYSTEM WILL CONTINUE TO LEAK UNTIL THE SUPPLY IS CLOSED UPSTREAM OF THE GALLEY. IF LEAKAGE IS SEVERE IT COULD EFFECT THE LENGTH OF THE MISSION.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 8/24/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5181 ABORT: /NA

ITEM: AUXILIARY PORT - POTABLE WATER  
FAILURE MODE: RESTRICTED FLOW

LEAD ANALYST: B. RICHARD SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) GALLEY
- 3) WATER SUPPLY
- 4) AUXILIARY PORT
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: GALLEY

PART NUMBER:

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

THIS FAILURE WILL PREVENT USE OF THE AUXILIARY PORT FOR POTABLE WATER. OTHER MEANS WILL HAVE TO BE USED.

REFERENCES: JSC 12770, SSSH 6.6

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/28/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 5300

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/2R  
ABORT: /NA

ITEM: OPERATIONAL WATER DISPENSER QUICK DISCONNECTS  
FAILURE MODE: FAILS TO REMAIN CLOSED

LEAD ANALYST: L. GRAHAM

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL WATER DISPENSER
- 3) QUICK DISCONNECT CONNECTIONS
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ]      B [ P ]      C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: SED48101600

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

IF EITHER QUICK DISCONNECT FAILS (ON AMBIENT OR CHILLED WATER INPUTS) THE CREWMAN CAN DISCONNECT THAT LINE AND USE THE OTHER FOR REHYDRATION USES, ETC. IF THE PERSONAL HYGIENE CONTROL VALVE DISCONNECT FAILS, IFM PROCEDURES WILL RESOLVE THE PROBLEM. AS A LAST RESORT THE CONTINGENCY WATER DISPENSER CAN BE USED.  
MISSION ABORT NEEDED FOR LOSS OF ALL REDUNDANCY.

REFERENCES: JSC-12770 SFOM VOL. 12, JSC-20365, SED48101600

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 5301 ABORT: /NA

ITEM: OPERATIONAL WATER DISPENSER QUICK DISCONNECTS  
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL WATER DISPENSER
- 3) QUICK DISCONNECT CONNECTIONS
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: SED48101600

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

IF EITHER QUICK DISCONNECT FAILS (ON AMBIENT OR CHILLED WATER INPUTS) THE CREWMAN CAN DISCONNECT THAT LINE AND USE THE OTHER FOR REHYDRATION USES, ETC. IF THE PERSONAL HYGIENE CONTROL VALVE DISCONNECT FAILS, IFM PROCEDURES WILL RESOLVE THE PROBLEM. AS A LAST RESORT THE CONTINGENCY WATER DISPENSER CAN BE USED. MISSION ABORT NEEDED FOR LOSS OF ALL REDUNDANCY.

REFERENCES: JSC-12770 SFOM VOL. 12, JSC-20365, SED48101600

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 4/17/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 5302

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/2R  
ABORT: /NA

ITEM: OPERATIONAL WATER DISPENSER AMBIENT/CHILLED/OFF  
WATER VALVE  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL WATER DISPENSER
- 3) AMBIENT/CHILLED/OFF WATER VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: SED48101600

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE,  
PIECE-PART FAILURE

EFFECTS/RATIONALE:

FAILURE OF VALVE TO MOVE FROM "OFF" POSITION WOULD NOT PRECLUDE  
USE OF PERSONAL HYGIENE VALVE OR CONTINGENCY WATER DISPENSER.  
MISSION ABORT NEEDED FOR LOSS OF ALL REDUNDANCY.

REFERENCES: JSC-12770 SFOM VOL. 12, JSC-20365, SED48101600

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 5303 ABORT: /NA

ITEM: OPERATIONAL WATER DISPENSER AMBIENT/CHILLED/OFF  
WATER VALVE  
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL WATER DISPENSER
- 3) AMBIENT/CHILLED/OFF WATER VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: SED48101600

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE,  
PIECE-PART FAILURE

EFFECTS/RATIONALE:

MISSION ABORT NEEDED FOR LOSS OF ALL REDUNDANCY. CREW IFM  
PROCEDURES WOULD BE USED TO REPAIR LEAKING COMPONENT/CONNECTION.  
EXTERNAL LEAKAGE WOULD BE CONTAINED IN WATER DISPENSER ASSEMBLY.

REFERENCES: JSC-12770 SFOM VOL. 12, JSC-20365, SED48101600

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/01/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 5304

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/2R  
ABORT: /NA

ITEM: OPERATIONAL WATER DISPENSER AMBIENT/CHILLED/OFF  
WATER VALVE  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL WATER DISPENSER
- 3) AMBIENT/CHILLED/OFF WATER VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: SED48101600

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE,  
PIECE-PART FAILURE

EFFECTS/RATIONALE:  
FAILURE OF VALVE TO MOVE FROM AMBIENT TO CHILLED (OR VICE VERSA)  
WOULD STILL ALLOW USE OF THE OPERATIONAL WATER DISPENSER,  
PERSONAL HYGIENE VALVE, OR CONTINGENCY WATER DISPENSER. MISSION  
ABORT NEEDED FOR LOSS OF ALL REDUNDANCY.

REFERENCES: JSC-12770 SFOM VOL. 12, JSC-20365, SED48101600

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 4/17/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 5305 ABORT: /NA

ITEM: OPERATIONAL WATER DISPENSER PRESSURE REGULATOR  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL WATER DISPENSER
- 3) PRESSURE REGULATOR
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: SED48101600

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE

EFFECTS/RATIONALE:

FAILURE TO ALLOW WATER TO REACH END OF DISPENSER FOR NEEDLE VALVE DISPENSING. CREWMAN CAN STILL OBTAIN WATER THROUGH USE OF BYPASS VALVE, CONTINGENCY WATER DISPENSER, OR PERSONAL HYGIENE VALVE. MISSION ABORT NEEDED FOR LOSS OF ALL REDUNDANCY.

REFERENCES: JSC-12770 SFOM VOL. 12, JSC-20365, SED48101600

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 5306 ABORT: /NA

ITEM: OPERATIONAL WATER DISPENSER PRESSURE REGULATOR  
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL WATER DISPENSER
- 3) PRESSURE REGULATOR
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE

PART NUMBER: SED48101600

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE

EFFECTS/RATIONALE:

POSSIBLE INABILITY TO MAINTAIN CONSTANT WATER PRESSURE AT REHYDRATION NEEDLE. CREW IFM PROCEDURES WOULD BE USED TO REPAIR LEAKING COMPONENT/CONNECTION. EXTERNAL LEAKAGE WOULD BE CONTAINED IN WATER DISPENSER ASSEMBLY. MISSION ABORT NEEDED FOR LOSS OF ALL REDUNDANCY.

REFERENCES: JSC-12770 SFOM VOL. 12, JSC-20365, SED48101600

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 5307 ABORT: /NA

ITEM: OPERATIONAL WATER DISPENSER BYPASS VALVE  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL WATER DISPENSER
- 3) BYPASS VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: SED48101600

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE,  
PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:

BYPASS VALVE IS A CONTINGENCY DEVICE ON WATER DISPENSER. MISSION  
BORT NEEDED FOR LOSS OF ALL REDUNDANCY. CONTINGENCY WATER  
DISPENSER STILL AVAILABLE.

REFERENCES: JSC-12770 SFOM VOL. 12, JSC-20365, SED48101600

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE:	6/01/87	HIGHEST CRITICALITY	HDW/FUNC
SUBSYSTEM:	CREW EQUIPMENT	FLIGHT:	3/2R
MDAC ID:	5308	ABORT:	/NA

ITEM: OPERATIONAL WATER DISPENSER BYPASS VALVE  
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: L. GRAHAM      SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL WATER DISPENSER
- 3) BYPASS VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ]      B [ P ]      C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: SED48101600

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE,  
VIBRATION

EFFECTS/RATIONALE:

BYPASS VALVE IS A CONTINGENCY DEVICE ON WATER DISPENSER. CREW IFM PROCEDURES WOULD BE USED TO REPAIR LEAKING COMPONENT/CONNECTION. EXTERNAL LEAKAGE WOULD BE CONTAINED IN WATER DISPENSER ASSEMBLY. MISSION ABORT NEEDED FOR LOSS OF ALL REDUNDANCY.

REFERENCES: JSC-12770 SFOM VOL. 12, JSC-20365, SED48101600

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 5309 ABORT: /NA

ITEM: OPERATIONAL WATER DISPENSER SOLENOID VALVE  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL WATER DISPENSER
- 3) SOLENOID VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: SED48101600

CAUSES: CONTAMINATION, MECHANICAL SHOCK, PIECE-PART FAILURE,  
VIBRATION

EFFECTS/RATIONALE:

BYPASS VALVE CAN STILL BE USED TO SUPPLY WATER TO THE REHYDRATION NEEDLE. CONTINGENCY WATER DISPENSER ALSO AVAILABLE. MISSION ABORT NEEDED FOR LOSS OF ALL REDUNDANCY.

REFERENCES: JSC-12770 SFOM VOL. 12, JSC-20365, SED48101600

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 5310 ABORT: /NA

ITEM: OPERATIONAL WATER DISPENSER SOLENOID VALVE  
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL WATER DISPENSER
- 3) SOLENOID VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE

PART NUMBER: SED48101600

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:

CREW IFM PROCEDURES WOULD BE USED TO REPAIR LEAKING COMPONENT/CONNECTION. EXTERNAL LEAKAGE WOULD BE CONTAINED IN WATER DISPENSER ASSEMBLY. BYPASS VALVE CAN STILL BE USED TO SUPPLY WATER TO THE REHYDRATION NEEDLE. MISSION ABORT NEEDED FOR LOSS OF ALL REDUNDANCY.

REFERENCES: JSC-12770 SFOM VOL. 12, JSC-20365, SED48101600

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/01/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 5311 ABORT: /NA

ITEM: OPERATIONAL WATER DISPENSER ROTARY SELECTION  
SWITCH  
FAILURE MODE: FAILS TO SWITCH

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPEATIONAL WATER DISPENSER
- 3) ROTARY SELECTION SWITCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: SED48101600

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:

IF SWITCH FAILS OFF (SOLENOID DISPENSING VALVE CLOSED) NO WATER WILL PASS THROUGH. CREW WILL HAVE TO USE BYPASS VALVE. IF SWITCH STICKS AT A GIVEN SETTING, CREW CAN STILL USE IT BY MANUAL TIMING FLOW (1 oz./SECOND). CONTINGENCY WATER DISPENSER ASSEMBLY STILL AVAILABLE. MISSION ABORT NEEDED FOR LOSS OF ALL REDUNDANCY.

REFERENCES: JSC-12770 SFOM VOL. 12, JSC-20365, SED48101600

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 5312 ABORT: /NA

ITEM: OPERATIONAL WATER DISPENSER REHYDRATION NEEDLE  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL WATER DISPENSER
- 3) REHYDRATION NEEDLE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE

PART NUMBER: SED48101600

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

REPLACEMENT REHYDRATION NEEDLE FLOWN. CONTINGENCY WATER DISPENSER ALSO FLOWN ON EVERY MISSION. MISSION ABORT NEEDED FOR LOSS OF ALL REDUNDANCY.

REFERENCES: JSC-12770 SFOM VOL. 12, JSC-20365, SED48101600

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5313 ABORT: /NA

ITEM: OPERATIONAL WATER DISPENSER MICROBIAL CHECK VALVE  
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL WATER DISPENSER
- 3) MICROBIAL CHECK VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: SED48101600

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

WILL NOT RESULT IN LOSS OF MISSION OR LOSS OF FUNCTION. USED TO PREVENT BACTERIAL CONTAMINATION FROM BOTH ORBITER SUPPLY-SIDE AND BACKFLOW FROM PERSONAL HYGIENE VALVE. ORBITER SUPPLY-SIDE HAS MICROBIAL CHECK VALVE.

REFERENCES: JSC-12770 SFOM VOL. 12, JSC-20365, SED48101600

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/03/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 5314

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: OPERATIONAL WATER DISPENSER MICROBIAL CHECK VALVE  
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL WATER DISPENSER
- 3) MICROBIAL CHECK VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: SED48101600

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:

LOSS OF FUNCTION PREVENTS USE OF PERSONAL HYGIENE VALVE (USED TO WASH HANDS, FACE, ETC.). SHOULD NOT CAUSE LOSS OF MISSION. CREW IFM ACTIONS ABLE TO REPAIR VALVE.

REFERENCES: JSC-12770 SFOM VOL. 12, JSC-20365, SED48101600

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 5315 ABORT: /NA

ITEM: OPERATIONAL WATER DISPENSER MICROBIAL CHECK VALVE  
FAILURE MODE: INTERNAL LEAKAGE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL WATER DISPENSER
- 3) MICROBIAL CHECK VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: SED48101600

CAUSES: CONTAMINATION, PIECE-PART FAILURE, VIBRATION

EFFECTS/RATIONALE:

IODINE BEADS MAY FAIL THUS ALLOWING BACKFLOW OF CONTAMINATION WATER (FROM PERSONAL HYGIENE VALVE). ORBITER SUPPLY SIDE HAS MICROBIAL CHECK VALVE. MISSION ABORT NEEDED FOR LOSS OF POTABLE WATER SUPPLY.

REFERENCES: JSC-12770 SFOM VOL. 12, JSC-20365, SED48101600

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/03/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 5316

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: OPERATIONAL WATER DISPENSER PERSONAL HYGIENE VALVE  
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: L. GRAHAM

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL WATER DISPENSER
- 3) HYGIENE VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: SED48101600

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

LOSS OF PERSONAL HYGIENE VALVE HARDWARE WILL NOT RESULT IN LOSS OF MISSION. CREW IFM AND ACTIONS WILL REDUCE AMOUNT OF WATER SPILLAGE.

REFERENCES: JSC-12770 SFOM VOL. 12, JSC-20365, SED48101600

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5317 ABORT: /NA

ITEM: OPERATIONAL WATER DISPENSER PERSONAL HYGIENE VALVE  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL WATER DISPENSER
- 3) HYGIENE VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: SED48101600

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

LOSS OF PERSONAL HYGIENE VALVE HARDWARE WILL NOT RESULT IN LOSS OF MISSION. LOSS OF ALL FUNCTIONAL REDUNDANCY WILL NOT RESULT IN LOSS OF MISSION.

REFERENCES: JSC-12770 SFOM VOL. 12, JSC-20365, SED48101600

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5318 ABORT: /NA

ITEM: OPERATIONAL WATER DISPENSER PERSONAL HYGIENE VALVE  
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL WATER DISPENSER
- 3) HYGIENE VALVE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE

PART NUMBER: SED48101600

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

FAILURE OF HARDWARE ITEM WILL NOT CAUSE LOSS OF MISSION. CREW IFM PROCEDURES WILL REPAIR LEAK. CREW CAN USE REHYDRATION NEEDLE AS WATER SOURCE FOR PERSONAL HYGIENE. LOSS OF ALL REDUNDANCY FOR THIS FUNCTION (PERSONAL HYGIENE) WILL NOT CAUSE LOSS OF MISSION.

REFERENCES: JSC-12770 SFOM VOL. 12, JSC-20365, SED48101600

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5319 ABORT: /NA

ITEM: OPERATIONAL WATER DISPENSER HOLDING CLIPS  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL WATER DISPENSER
- 3) HOLDING CLIPS
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: SED48101600

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

WATER DISPENSER STOWED DURING ASCENT AND DESCENT. IF HOLDING CLIPS FAIL WHILE ON-ORBIT WATER DISPENSER WILL SIMPLY FLOAT AROUND. ANY 1 OF 4 HOLDING CLIPS WILL HOLD DISPENSER IN PLACE.

REFERENCES: JSC-12770 SFOM VOL. 12, JSC-20365, SED48101600

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/03/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 5320

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: OPERATIONAL WATER DISPENSER INPUT POWER CONNECTOR  
FAILURE MODE: OPEN, SHORTED

LEAD ANALYST: L. GRAHAM

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL WATER DISPENSER
- 3) INPUT POWER CONNECTOR
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/3
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ]      B [ ]      C [ ]

LOCATION: CREW MODULE  
PART NUMBER: SED48101600

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

EITHER OPEN OR SHORT WILL CAUSE CONTROLLER TO STOP FUNCTIONING.  
CREW IFM CAN REPAIR PHYSICAL DAMAGE (PIN KIT, PLIERS, ETC.). NO  
REDUNDANCY FOR POWER INPUT. CONTINGENCY DISPENSER AND PERSONAL  
HYGIENE VALVE CAN STILL BE USED DESPITE LOSS OF CONTROLLER.

REFERENCES: JSC-12770, JSC-20466, SED33102348

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R ,  
MDAC ID: 5321 ABORT: /NA

ITEM: OPERATIONAL WATER DISPENSER FLEX LINE  
FAILURE MODE: STRUCTURAL FAILURE (RUPTURE)

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL WATER DISPENSER
- 3) FLEX WATER LINE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/3
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: SED48101600

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

CREW CAN "SWITCH-OUT" FAILED FLEX LINE WITH OTHER FLEX LINES.  
MISSION ABORT NEEDED FOR LOSS OF ALL REDUNDANCY.

REFERENCES: JSC-12770 SFOM VOL. 12, JSC-20365, SED48101600

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 5322 ABORT: /NA

ITEM: OPERATIONAL WATER DISPENSER FLEX LINES  
FAILURE MODE: FAILS TO REMAIN OPEN

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) OPERATIONAL WATER DISPENSER
- 3) FLEXIBLE WATER LINES
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: SED48101600

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

CREW CAN PERFORM IFM TO REPAIR LINES. MULTIPLE REDUNDANT LINES AVAILABLE FOR SWITCHING OUT. MISSION ABORT NEEDED FOR LOSS OF ALL REDUNDANCY.

REFERENCES: JSC-12770 SFOM VOL. 12, JSC-20365, SED48101600

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/2R  
MDAC ID: 5400 ABORT: /NA

ITEM: CONTINGENCY WATER DISPENSER  
FAILURE MODE: EXTERNAL LEAKAGE

LEAD ANALYT: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) CONTINGENCY WATER DISPENSER
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: SED48101607

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

CREW CAN PERFORM IFM TO REPAIR THIS DISPENSER, THEREBY REDUCING HARDWARE CRITICALITY. MISSION ABORT MUST OCCUR UPON LOSS OF ALL REDUNDANCY.

REFERENCES: JSC-20365, SED48101607

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/03/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 5401

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/2R  
ABORT: /NA

ITEM: CONTINGENCY WATER DISPENSER  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) CONTINGENCY WATER DISPENSER
- 3)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/2R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: SED48101607

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

CREW CAN PERFORM IFM TO REPAIR THIS DISPENSER, THEREBY REDUCING HARDWARE CRITICALITY. MISSION ABORT MUST OCCUR UPON LOSS OF ALL REDUNDANCY.

REFERENCES: JSC-20365, SED48101607

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 6/03/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 5402 ABORT: /NA

ITEM: CONTINGENCY WATER DISPENSER  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) CONTINGENCY WATER DISPENSER
- 3) REHYDRATION NEEDLE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: SED48101607

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

REHYDRATION NEEDLE BREAKS. CAN STILL DISPENSE WATER.

REFERENCES: JSC-20365, SED48101607

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/13/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 6100

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: SLEEPING BAG - ADJUSTABLE STRAPS  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) SLEEP RESTRAINTS
- 3) ADJUSTABLE STRAPS
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW COMPARTMENT

PART NUMBER:

CAUSES: MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

THE ADJUSTABLE STRAPS ON THE SLEEPING RESTRAINT HOLD THE SLEEPING BAG IN PLACE ON THE LOCKERS. FAILURE OF ANY STRAP MEANS THE BAG WILL NOT BE AS SECURELY RESTRAINED AS INTENDED BUT NO SAFETY IMPLICATIONS.

REFERENCES: JSC 12770, V601-669100

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/13/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6101 ABORT: /NA

ITEM: SLEEPING BAG - HELICAL SPRING  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) SLEEP RESTRAINTS
- 3) ADJUSTABLE STRAPS
- 4) HELICAL SPRING
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW COMPARTMENT  
PART NUMBER: E0360-055-30005

CAUSES: MECHANICAL SHOCK, PIECE-PART FAILURE

EFFECTS/RATIONALE:

THE HELICAL SPRING IS ONE COMPONENT OF THE ADJUSTABLE STRAPS.  
FAILURE OF THE SPRING MEANS SIMPLY THAT THE SLEEPING BAG WILL NOT  
BE AS SECURELY FASTENED AS INTENDED BUT NO SAFETY IMPLICATIONS.

REFERENCES: JSC 12770, V601-669100

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/14/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 6102

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: SLEEPING BAG - CLOTH TUNNEL  
FAILURE MODE: STRUCTURAL FAILURE TEARS

LEAD ANALYST: S.K. SINCLAIR      SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) SLEEP RESTRAINTS
- 3) ADJUSTABLE STRAPS
- 4) HELICAL SPRING
- 5) CLOTH TUNNEL
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ]      B [ ]      C [ ]

LOCATION: CREW COMPARTMENT

PART NUMBER:

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

THE CLOTH TUNNEL SURROUNDS THE HELICAL SPRING ON THE SLEEPING BAG ADJUSTED STRAP. A RIP IN THE CLOTH TUNNEL WILL HAVE NO AFFECT.

REFERENCES: JSC 12770, V601-669100

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/14/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6103 ABORT: /NA

ITEM: SLEEPING BAG - SPRING CLIP  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) SLEEP RESTRAINTS
- 3) ADJUSTABLE STRAPS
- 4) SPRING CLIP
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW COMPARTMENT  
PART NUMBER: NF 12480

CAUSES: MECHANICAL SHOCK, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

A FAILURE OF THE SPRING CLIP TO OPEN MEANS THAT THE PIP PIN CANNOT BE ATTACHED AND THE SLEEPING BAG SECURELY POSITIONED. NO EFFECT ON FUTURE OPERATIONS.

REFERENCES: JSC 12770, V601-669100

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/14/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6104 ABORT: /NA

ITEM: SLEEPING BAG - SPRING CLIP  
FAILURE MODE: FAILS TO REMAIN CLOSED

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) SLEEP RESTRAINTS
- 3) ADJUSTABLE STRAPS
- 4) SPRING CLIP
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW COMPARTMENT

PART NUMBER: NF 12480

CAUSES: MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE,  
VIBRATION

EFFECTS/RATIONALE:

THE SPRING CLIP COMING OPEN MEANS THE SLEEPING BAG WILL NOT BE AS SECURELY RESTRAINED AS DESIGNED. NO AFFECT ON FUTURE OPERATIONS.

REFERENCES: JSC 12770, V601-669100

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/14/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6105 ABORT: /NA

ITEM: SLEEPING BAG - PIP PIN  
FAILURE MODE: PULLS OUT

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) SLEEP RESTRAINTS
- 3) ADJUSTABLE STRAPS
- 4) PIP PINS
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

A [ ]      B [ ]      C [ ]

LOCATION: CREW COMPARTMENT  
PART NUMBER: TBD

CAUSES: MECHANICAL SHOCK, OVERLOAD

EFFECTS/RATIONALE:

THE PIP PIN PULLING OUT OF THE MIDDECK LOCKER WALL MEANS THE SLEEPING BAG WILL NOT BE AS FULLY RESTRAINED AS DESIGNED. NO IMPACT ON FUTURE OPERATIONS.

REFERENCES: JSC 12770, V601-669100

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/14/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6106 ABORT: /NA

ITEM: SLEEPING BAG - MOUNTING LOCATION  
FAILURE MODE: FAILS TO HOLD PIP PIN

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) SLEEP BAG
- 3) PIP PIN MOUNTING LOCATION
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW COMPARTMENT

PART NUMBER: TBD

CAUSES: CONTAMINATION

EFFECTS/RATIONALE:

THE PIP PIN MOUNTS THE SLEEPING BAG ON THE MODULAR MIDDECK LOCKERS. CONTAMINATION IN THE MOUNTING SPOTS MEANS THE SLEEPING BAG CANNOT BE PLACED IN ITS DESIGNATED LOCATION AND AN ALTERNATE LOCATION MUST BE FOUND. NO IMPACT ON FUTURE OPERATIONS.

REFERENCES: JSC 12770, V601-669100

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/14/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6107 ABORT: /NA

ITEM: SLEEPING BAG RESTRAINTS - BUCKLE FLAP  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) SLEEP RESTRAINTS
- 3) BUCKLE FLAP
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW COMPARTMENT  
PART NUMBER: TBD

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

THE BUCKLE FLAP HOLDS THE RESTRAINTS ON THE PAD. A FAILURE OF THE FLAP MEANS THE RESTRAINTS MAY NOT OPERATE COMPLETELY AS DESIGNED BUT NO IMPACT ON FUTURE OPERATIONS.

REFERENCES: JSC 12770, V601-669100

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/14/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 6108

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: ATTACHMENT ZIPPER(S)  
FAILURE MODE: BREAKS

LEAD ANALYST: S.K. SINCLAIR      SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) SLEEPING BAG
- 3) ATTACHMENT ZIPPERS
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ]      B [ ]      C [ ]

LOCATION: CREW COMPARTMENT

PART NUMBER: TBD

CAUSES: MISHANDLING/ABUSE

EFFECTS/RATIONALE:

A BREAK IN THE ZIPPER THAT ATTACHES THE SLEEPING BAG TO THE NOMEX PAD MEANS THE TWO ITEMS WILL BE SEPARATED. ALTERNATE MEANS OF SECURING THE BAG TO THE PAD CAN BE DEVISED; OR THE SLEEPING BAG CAN BE USED ALONE WITHOUT THE NOMEX PAD.

REFERENCES: JSC 12770, V601-669100

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/14/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6109 ABORT: /NA

ITEM: CLOSURE ZIPPER  
FAILURE MODE: BREAKS

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) SLEEPING BAG
- 3) CLOSURE ZIPPER
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW COMPARTMENT  
PART NUMBER: TBD

CAUSES: MISHANDLING/ABUSE

EFFECTS/RATIONALE:

IF THE SLEEPING BAG CLOSURE ZIPPER BREAKS, THE CREWMEMBER WILL NO LONGER BE RESTRAINED IN THE BAG. ALTERNATE PLACES FOR SLEEPING ARE AVAILABLE. THE FAILURE SHOULD NOT PRESENT ANY PROBLEMS.

REFERENCES: JSC 12770, V601-669100

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/14/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT:  
MDAC ID: 6110 ABORT: /NA

ITEM: BODY RESTRAINTS  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: S.K. SINCLAIR SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) SLEEP RESTRAINTS
- 3) BODY RESTRAINTS
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW COMPARTMENT

PART NUMBER:

CAUSES: MISHANDLING/ABUSE, STRUCTURAL FAILURE

EFFECTS/RATIONALE:

RESTRAINT CAN BE REPAIRED BY TAPE OR OTHER EQUIPMENT AS AVAILABLE.

REFERENCES: JSC 12770, V601-669100

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/22/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6111 ABORT: /NA

ITEM: FOUR-TIER SLEEP STATION SLIDING DOOR  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) FOUR-TIER SLEEP STATIONS
- 3) SLIDING DOOR
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW COMPARTMENT

PART NUMBER:

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

DOOR FAILS TO SLIDE OPEN OR CLOSED. IFM TOOLS MAY BE USED TO FREE THE DOOR.

REFERENCES: JSC 12770, V601-669100

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/22/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 6112

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: FOUR-TIER SLEEP STATION CAPTIVE WING NUT FASTENER  
FAILURE MODE: FAILS TO TIGHTEN/LOOSEN

LEAD ANALYST: H. SAXON

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) FOUR-TIER SLEEP STATIONS
- 3) CAPTIVE WING NUT FASTENER
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW COMPARTMENT

PART NUMBER:

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

WING NUT FASTENERS SECURE THE PANELS COVERING FLOOR COMPARTMENT VOLUME E, FLOOR COMPARTMENT F, AND THE WET TRASH COMPARTMENT. IFM TOOLS MAY BE USED TO REMOVE OR REPLACE WING NUT FASTENERS.

REFERENCES: JSC 12770, V601-669100

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/22/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6113 ABORT: /NA

ITEM: FOUR-TIER SLEEP STATION AIR DIFFUSER  
FAILURE MODE: FAILS TO START/STOP

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) FOUR-TIER SLEEP STATIONS
- 3) AIR DIFFUSER
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW COMPARTMENT

PART NUMBER:

CAUSES: LOSS OF INPUT

EFFECTS/RATIONALE:

AIR DIFFUSER IN A SLEEP STATION COULD FAIL TO START OR FAIL TO STOP. AIR CIRCULATION WOULD BE REDUCED, BUT IS NOT LIFE OR MISSION THREATENING.

REFERENCES: JSC 12770, V601-669100

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/22/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6114 ABORT: /NA

ITEM: FOUR-TIER SLEEP STATION LIGHT  
FAILURE MODE: FAILS TO TURN ON/OFF

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) FOUR-TIER SLEEP STATIONS
- 3) LIGHT
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW COMPARTMENT

PART NUMBER:

CAUSES: CONTAMINATION, VIBRATION

EFFECTS/RATIONALE:

LIGHT IN SLEEP STATION FAILS TO TURN ON/OFF. THIS IS NO THREAT  
TO MISSION OR LIFE.

REFERENCES: JSC 12770, V601-669100

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/1R  
MDAC ID: 6200 ABORT: /NA

ITEM: ORBITER SIDE HATCH SAFETY LOCK PIP PIN  
FAILURE MODE: CANNOT INSERT PIN

LEAD ANALYST: H. SAXON SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) ORBITER SIDE HATCH SAFETY LOCK
- 3) PIP PIN
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW COMPARTMENT  
PART NUMBER: SED33103383

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

SAFETY LOCK CANNOT BE INSTALLED. THE SIDE HATCH COULD BE ACCIDENTALLY OPENED WHICH COULD RESULT IN POSSIBLE LOSS OF CREW. ANOTHER PIP PIN COULD BE USED OR THE SAFETY LOCK COULD BE SECURED BY OTHER TOOLS OR TAPE.

REFERENCES: SED33103383

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 7/28/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 6201

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/1R  
ABORT: /NA

ITEM: ORBITER SIDE HATCH SAFETY LOCK PIP PIN  
FAILURE MODE: CANNOT REMOVE PIN

LEAD ANALYST: H. SAXON

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) ORBITER SIDE HATCH SAFETY LOCK
- 3) PIP PIN
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/1R	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW COMPARTMENT

PART NUMBER: SED33103383

CAUSES: CONTAMINATION, MISHANLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

THE SAFETY LOCK CANNOT BE REMOVED AND THE HATCH CANNOT BE OPENED.  
THE PIP PIN MAY BE REMOVED BY CUTTING.

REFERENCES: SED33103383

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/29/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/1R  
MDAC ID: 6300 ABORT: /NA

ITEM: MIDDECK STOWAGE LOCKER DOOR  
FAILURE MODE: FAILS TO OPEN

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) MIDDECK STOWAGE LOCKER
- 3) LOCKER DOOR
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/1R	AOA:	/NA
DEORBIT:	3/1R	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: V602-660604

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE,  
PIECE-PART FAILURE, PRESSURE

EFFECTS/RATIONALE:

IFM PROCEDURES DETAIL USING IFM PRY BAR OR ESCAPE PRY BAR (WHICH IS NOT STORED IN LOCKER) TO OPEN STUCK DOOR. FAILURE TO OPEN ON-ORBIT IS DUE TO SHIFTING OF ORBITER MOUNTING STRUCTURE. FAILURE TO OPEN DURING PRELAUNCH PHASE IS NO PROBLEM SINCE LOCKER CHANGEOUT WOULD OCCUR BEFORE LAUNCH IF DOOR FAILED TO OPEN. ASSUMING LOCKER CONTENTS CONTAIN EMERGENCY EQUIPMENT, LOSS OF ALL REDUNDANCY COULD RESULT IN LOSS OF LIFE AND VEHICLE.

REFERENCES: JSC-17321, V602-660604

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/29/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6301 ABORT: /NA

ITEM: MIDDECK STOWAGE LOCKER DOOR  
FAILURE MODE: FAILS TO CLOSE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) MIDDECK STOWAGE LOCKER
- 3) LOCKER DOOR
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: V602-660604

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE,  
PIECE-PART FAILURE, PRESSURE

EFFECTS/RATIONALE:

IFM PROCEDURES DETAILS TWO METHODS TO FORCE CLOSURE OF MIDDECK  
LOCKER DOORS. CAN ALSO TAPE DOORS CLOSED. FAILURE TO CLOSE  
WHILE ON-ORBIT DUE TO SHIFTING OF ORBITER MOUNTING STRUCTURE.  
FAILURE TO CLOSE DURING PRELAUNCH PHASE IS NO PROBLEM SINCE  
LOCKER CHANGEOUT WOULD OCCUR BEFORE LAUNCH IF DOOR FAILED TO  
CLOSE.

REFERENCES: JSC-17321, V602-660604

INDEPENDENT ORBITERASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/29/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6302 ABORT: /NA

ITEM: MIDDECK STOWAGE LOCKER DOOR HINGE PIN  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) MIDDECK STOWAGE LOCKER
- 3) LOCKER DOOR HINGE PIN
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: V602-660604

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

HINGE PIN FAILS. BROKEN PIN CAN STILL FUNCTION AS HINGE PIN.

REFERENCES: JSC-17321, V602-660604

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/29/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 6303

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/1R  
ABORT: 3/1R

ITEM: MIDDECK STOWAGE LOCKER DOOR  
FAILURE MODE: FAILS TO REMAIN CLOSED

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) MIDDECK STOWAGE LOCKER
- 3) DOOR LATCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/1R	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: V602-660604

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

LOCKER LATCH FAILS TO CATCH/HOLD. TWO CATCHES ON EACH LOCKER DOOR ANY ONE OF WHICH WOULD PERFORM THE CLOSURE FUNCTION. LOSS OF ALL REDUNDANCY COULD PERMIT DOOR TO OPEN AND CONTENTS BE RELEASED TO CABIN. DURING ASCENT/ENTRY THE CONTENTS COULD INJURE CREWMEMBER AND/OR DAMAGE VEHICLE.

REFERENCES: JSC-17321, V602-660604

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/27/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6400 ABORT: /NA

ITEM: TREADMILL EXERCISER ASSEMBLY  
FAILURE MODE: PHYSICAL BINDING/JAMMING

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TREADMILL EXERCISER ASSEMBLY
- 3) TREADMILL BELT
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: 10131-10031-02

CAUSES: CONTAMINATION, PIECE-PART FAILURE

EFFECTS/RATIONALE:

TREADMILL BELT WILL STOP ROTATING. CREWMAN MAY STUMBLE BUT SHOULD NOT BE INJURED SINCE THE HIGHEST SPEED IS NORMALLY A JOGGING-TYPE PACE. SUDDEN STOP MAY BE CAUSED BY PARTICULATE CONTAMINATION OR PIECE-PART FAILURE OF RAPID ONSET BRAKING SYSTEM.

REFERENCES: JSC-12770 SFOM VOL. 12, 10131-10031

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/27/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 6401

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: TREADMILL EXERCISER ASSEMBLY BUNGEE FORCE CORD  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TREADMILL EXERCISER ASSEMBLY
- 3) BUNGEE FORCE CORD
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: 10131-10031

CAUSES: OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

FORCE CORD (OR BUNGEE CORD) FAILS, HOOK ON END OF FORCE CORD FAILS AND DETACHES FROM BUNGEE CLEAT, OR SLIP BUCKLE FAILS. CREWMAN MAY FLOAT OUT OF RESTRAINING RIG BUT NOT AT SUFFICIENT VELOCITY TO CAUSE INJURY.

REFERENCES: JSC-12770 SFOM VOL. 12, 10131-10031

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/27/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6402 ABORT: /NA

ITEM: TREADMILL EXERCISER ASSEMBLY SHOULDER STRAP  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TREADMILL EXERCISER ASSEMBLY
- 3) SHOULDER STRAP
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: 10131-10031

CAUSES: OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

SHOULDER STRAP FAILS, HOOK CONNECTING SHOULDER STRAP TO WAISTBELT FAILS. SHOULDER STRAP MATERIAL MAY TEAR BY OVERLOAD, HOOK MAY FAIL DUE TO PRODUCTION FAILURE. CREWMAN MAY FLOAT OUT OF RESTRAINING RIG BUT NOT AT SUFFICIENT VELOCITY TO CAUSE INJURY.

REFERENCES: JSC-12770 SFOM VOL. 12, 10131-10031

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/27/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 6403

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: TREADMILL EXERCISER ASSEMBLY WAIST BELT  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TREADMILL EXERCISER ASSEMBLY
- 3) WAIST BELT
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: 10131-10031

CAUSES: OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

WAIST BELT MATERIAL FAILS, BRASS RING IN WAIST BELT FAILS, RETAINING PIN FAILS, RING TO HOLD SHOULDER STRAP HOOKS FAIL, SLIP BUCKLE FAILS. ANY FAILURE MAY OCCUR DUE TO OVERLOAD OR MATERIAL FAILURE. CREWMAN MAY FLOAT OUT OF RESTRAINING RIG BUT NOT SUFFICIENT VELOCITY TO CAUSE INJURY.

REFERENCES: JSC-12770 SFOM VOL. 12, 10131-10031

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/27/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6404 ABORT: /NA

ITEM: TREADMILL EXERCISER ASSEMBLY PHYSIOLOGICAL MONITOR  
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TREADMILL EXERCISER ASSEMBLY
- 3) PHYSIOLOGICAL MONITOR
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: 10131-10031

CAUSES: CONTAMINATION, MECHANICAL SHOCK, MISHANDLING/ABUSE

EFFECTS/RATIONALE:

PHYSIOLOGICAL MONITOR FAILS. REDUCES EFFECTIVENESS OF TREADMILL  
BUT DOES NOT AFFECT CREW, VEHICLE, OR MISSION STATUS.

REFERENCES: JSC-12770 SFOM VOL. 12, 10131-10031

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/27/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6405 ABORT: /NA

ITEM: TREADMILL EXERCISER ASSEMBLY HANDLE ASSEMBLY  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TREADMILL EXERCISER ASSEMBLY
- 3) HANDLE ASSEMBLY
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: 10131-10031

CAUSES: MISHANDLING/ABUSE, OVERLOAD, PIECE-PART FAILURE

EFFECTS/RATIONALE:

TREADMILL EXERCISER HANDLE ASSEMBLY FAILS. FAILURE WILL REDUCE USEFULNESS OF TREADMILL. CREWMAN USING TREADMILL DURING FAILURE WILL NOT BE INJURED.

REFERENCES: JSC-12770 SFOM VOL. 12, 10131-10031

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/27/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6406 ABORT: /NA

ITEM: TREADMILL EXERCISE ASSEMBLY INFRARED SENSOR  
FAILURE MODE: LOSS OF OUTPUT

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TREADMILL EXERCISER ASSEMBLY
- 3) INFRARED SENSOR
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: 10131-10031

CAUSES: MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

INFRARED SENSOR FAILS OFF, SENSOR CABLE FAILS. PHYSIOLOGICAL MONITOR EFFECTIVENESS REDUCED. LOSS OF SENSOR AND/OR OUTPUT WILL NOT AFFECT CREW, VEHICLE, OR MISSION STATUS.

REFERENCES: JSC-12770 SFOM VOL. 12, 10131-10031

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/27/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6407 ABORT: /NA

ITEM: TREADMILL EXERCISER ASSEMBLY SPEED CONTROL KNOB  
FAILURE MODE: STRUCTURAL FAILURE

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TREADMILL EXERCISER ASSEMBLY
- 3) SPEED CONTROL KNOB
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: 10131-10031

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

SPEED CONTROL KNOB FAILS. UNABLE TO ADJUST PRESET BELT SPEED LIMIT. TREADMILL USEFULNESS REDUCED. SHOULD NOT AFFECT CREW, VEHICLE, OR MISSION STATUS.

REFERENCES: JSC-12770 SFOM VOL. 12, 10131-10031

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 5/27/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/1R  
MDAC ID: 6408 ABORT: 3/1R

ITEM: TREADMILL EXERCISER ASSEMBLY ATTACHMENT FITTINGS  
FAILURE MODE: FAILS TO REMAIN CLOSED

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) TREADMILL EXERCISER ASSEMBLY
- 3) ATTACHMENT FITTINGS
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	3/1R
LIFTOFF:	3/1R	TAL:	3/1R
ONORBIT:	3/3	AOA:	3/1R
DEORBIT:	3/1R	ATO:	3/1R
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ 2 ] B [ P ] C [ P ]

LOCATION: CREW MODULE  
PART NUMBER: 10131-10031

CAUSES: CONTAMINATION, MISHANDLING/ABUSE, PIECE-PART FAILURE

EFFECTS/RATIONALE:

QUICK DISCONNECT ATTACHMENT FITTINGS FAIL TO REMAIN CLOSED OR LOCKED DURING ASCENT/ENTRY. TREADMILL MAY DETACH ITSELF FROM MIDDECK FLOOR. CREW AND/OR VEHICLE MAY BE HARMED OR DAMAGED BY TREADMILL DURING ASCENT/ENTRY MANEUVERING.

REFERENCES: JSC-12770 SFOM VOL. 12, 10131-10031

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 4/13/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 6500

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: CREWMAN OPTICAL ALIGNMENT SIGHT (COAS) INTENSITY  
CONTROL/POWER SWITCH  
FAILURE MODE: INTENSITY CONTROL/POWER SWITCH FAILS OPEN

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) COAS
- 3) INTENSTY CONTROL OR POWER SWITCH
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: ME446-0045-0001

CAUSES: SHOCK, VIBRATION, WEAR, CONTAMINATION ON ELECTRICAL  
CONTACTS

EFFECTS/RATIONALE:

LOSS OF POWER TO LAMP RESULTING IN LOSS OF USE OF COAS. LOSS OF  
COAS MAY RESULT IN DELAY FOR RENDEZVOUS AND LOSS OF BACKUP IMU  
ALIGNMENT AND VERIFICATION CAPABILITY.

REFERENCES: V620-660810, SSSH 9.5

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 4/13/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6501 ABORT: /NA

ITEM: CREWMAN OPTICAL ALIGNMENT SIGHT (COAS) INTENSITY  
CONTROL  
FAILURE MODE: INTENSITY CONTROL FAILS CLOSED

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) COAS
- 3) INTENSITY CONTROL
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: ME446-0045-0001

CAUSES: SHOCK, VIBRATION, WEAR, CONTAMINATION ON ELECTRICAL  
CONTACTS

EFFECTS/RATIONALE:

UNABLE TO CONTROL BULB INTENSITY. IF INTENSITY CONTROL FAILS AT  
LOW INTENSITY COAS MAY BE USELESS DURING SOME RENDEZVOUS  
SITUATIONS.

REFERENCES: V620-660810, SSSH 9.5

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 4/13/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6502 ABORT: /NA

ITEM: CREWMAN OPTICAL ALIGNMENT SIGHT (COAS) LIGHT BULB  
FAILURE MODE: BULB FAILS OFF

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) COAS
- 3) BULB HOUSING ASSEMBLY
- 4) LIGHT BULB
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: V620-660815-003

CAUSES: BULB BURNS OUT OR FAILS DUE TO SHOCK OR VIBRATION

EFFECTS/RATIONALE:

UNABLE TO USE COAS FOR IMU REALIGNMENT. MAY CAUSE LOSS OF MISSION. HOWEVER, 2 SPARE BULBS ARE FLOWN ON EACH FLIGHT WHICH WOULD ALLOW THE CREWMAN TO REPLACE THE FAILED ONE.

REFERENCES: V620-660810, SSSH 9.5

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 4/13/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6503 ABORT: /NA

ITEM: CREWMAN OPTICAL ALIGNMENT SIGHT (COAS) MOUNTING  
BASE  
FAILURE MODE: FAILS TO ALLOW COAS TO ATTACH TO OR DETACH FROM  
BRACKETS

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) COAS
- 3) MOUNTING BASE
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: V620-660830-001

CAUSES: MISHANDLING BY CREWMAN DAMAGES BASE OR MOUNTING SCREWS  
ON COAS

EFFECTS/RATIONALE:

UNABLE TO ATTACH OR TO DETACH COAS FROM BRACKETS. UNABLE TO USE  
COAS DURING IMU REALIGNMENT (IF NECESSARY). CREWMAN CAN USE TAPE  
TO ATTACH COAS TO BRACKETS THEREBY OVERCOMING FAILURE.

REFERENCES: V620-660730, V620-660720

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 4/13/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6504 ABORT: /NA

ITEM: CREWMAN OPTICAL ALIGNMENT SIGHT (COAS) FORWARD  
ADAPTER BRACKET  
FAILURE MODE: FAILS TO ATTACH OR DETACH COAS

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) COAS
- 3) FORWARD ADAPTER BRACKET
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: V620-660720

CAUSES: MISHANDLING BY CREWMAN DAMAGES ADAPTER BRACKET OR  
ATTACHMENT THUMBSCREW ON FORWARD ADAPTER BRACKET.

EFFECTS/RATIONALE:  
UNABLE TO ASSIST IN COMPLETE IMU REALIGNMENT. CREWMAN CAN USE  
TAPE TO ATTACH COAS TO BRACKET THEREBY OVERCOMING FAILURE.

REFERENCES: V620-660720

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 4/13/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6505 ABORT: /NA

ITEM: CREWMAN OPTICAL ALIGNMENT SIGHT (COAS) FORWARD  
ADAPTER BRACKET  
FAILURE MODE: COAS MISALIGNMENT

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) COAS
- 3) FORWARD ADAPTER BRACKET
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: V620-660720

CAUSES: ACCIDENTAL CONTACT BY CREWMAN OR CONTACT WITH ANOTHER PIECE OF EQUIPMENT WHILE MOUNTED.

EFFECTS/RATIONALE:

ACCIDENTAL CONTACT MAY MISALIGN THE MOUNTED COAS WHEN IT IS ON THE FORWARD ADAPTER. IF THE MISALIGNMENT IS NOT NOTICED AND CORRECTED IT MAY CAUSE A PROBLEM DURING RENDEZVOUS/DOCKING OR IMU ALIGNMENT. CREWMAN CAN MANUALLY ADJUST COAS DURING SIGHTINGS TO OVERCOME MISALIGNMENT.

REFERENCES: V620-660720

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 4/13/87  
SUBSYSTEM: CREW EQUIPMENT  
MDAC ID: 6506

HIGHEST CRITICALITY HDW/FUNC  
FLIGHT: 3/3  
ABORT: /NA

ITEM: CREWMAN OPTICAL ALIGNMENT SIGHT (COAS) AFT  
MOUNTING BRACKET  
FAILURE MODE: FAILS TO ATTACH OR DETACH COAS

LEAD ANALYST: L. GRAHAM

SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) COAS
- 3) AFT MOUNTING BRACKET (ATTACHED TO ORBITER)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: V620-660730

CAUSES: CREWMAN ACCIDENTLY DAMAGES AFT MOUNTING BRACKET PLATE OR  
THREADED HOLES.

EFFECTS/RATIONALE:

UNABLE TO ATTACH OR DETACH COAS. POSSIBLY UNABLE TO ASSIST IN  
COMPLETE IMU ALIGNMENT. CREWMAN CAN USE TAPE TO ATTACH COAS TO  
BRACKET TO OVERCOME FAILURE.

REFERENCES: V620-660730

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 4/13/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6507 ABORT: /NA

ITEM: CREWMAN OPTICAL ALIGNMENT SIGHT (COAS) FORWARD  
MOUNTING BRACKET  
FAILURE MODE: FAILS TO ATTACH OR DETACH COAS

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) COAS
- 3) FORWARD MOUNTING BRACKET (ATTACHED TO ORBITER)
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: V620-660720

CAUSES: CREWMAN ACCIDENTLY DAMAGES FORWARD MOUNTING BRACKET PLATE OR THREADED HOLES

EFFECTS/RATIONALE:

UNABLE TO ASSIST IN COMPLETE IMU REALIGNMENT. CREWMAN CAN USE TAPE TO ATTACH COAS TO BRACKET THEREBY OVERCOMING FAILURE.

REFERENCES: V620-660720

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 4/13/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6508 ABORT: /NA

ITEM: CREWMAN OPTICAL ALIGNMENT SIGHT (COAS) APERTURE  
STOP  
FAILURE MODE: BROKEN APERTURE STOP

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) COAS
- 3) BARREL
- 4) APERTURE STOP
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE

PART NUMBER:

CAUSES: MISHANDLING BY CREWMAN, SHOCK, OR VIBRATION

EFFECTS/RATIONALE:

BROKEN STOP ALLOWS AN INCREASED AMOUNT OF SIDE-TO-SIDE HEAD MOVEMENT WHEN OBSERVING THE PROJECTED RETICLE IMAGE. COULD CAUSE CREWMAN TO MISREAD RANGE, RANGE RATE, OR ALIGNMENT DATA. CREWMAN CAN USE TAPE TO REPAIR APERTURE STOP.

REFERENCES: V620-660810, SSSH 9.5

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 4/13/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6509 ABORT: /NA

ITEM: CREWMAN OPTICAL ALIGNMENT SIGHT (COAS) APERTURE  
STOP  
FAILURE MODE: BROKEN APERTURE FILTER

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) COAS
- 3) COMBINER LENS ASSEMBLY
- 4) APERTURE FILTER
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES

FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE

PART NUMBER:

CAUSES: MISHANDLING BY CREWMAN, SHOCK, OR VIBRATION

EFFECTS/RATIONALE:

BROKEN FILTER ALLOWS GREATER FLARE WHEN VIEWING THE RETICLE IMAGE ON THE COMBINER LENS DURING FULL SUNLIGHT. POSSIBLE TO RENDER COAS UNUSABLE DURING FULL SUNLIGHT THEREBY CAUSING A DELAY IN RENDEZVOUS.

REFERENCES: V620-660810, SSSH 9.5

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 4/13/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6510 ABORT: /NA

ITEM: CREWMAN OPTICAL ALIGNMENT SIGHT (COAS) COMBINER  
LENS ASSEMBLY  
FAILURE MODE: COMBINER LENS ASSEMBLY BREAKS

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) COAS
- 3) COMBINER LENS ASSEMBLY
- 4)
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER:

CAUSES: MISHANDLING BY CREWMAN, SHOCK, OR VIBRATION

EFFECTS/RATIONALE:

BROKEN COMBINER LENS ASSEMBLY MAY RENDER COAS UNUSABLE DURING COMPLETE IMU REALIGNMENT. CREWMAN CAN USE TAPE TO REPAIR COMBINER LENS ASSEMBLY.

REFERENCES: V620-660810, SSSH 9.5

INDEPENDENT ORBITER ASSESSMENT  
ORBITER SUBSYSTEM ANALYSIS WORKSHEET

DATE: 4/13/87 HIGHEST CRITICALITY HDW/FUNC  
SUBSYSTEM: CREW EQUIPMENT FLIGHT: 3/3  
MDAC ID: 6511 ABORT: /NA

ITEM: CREWMAN OPTICAL ALIGNMENT SIGHT (COAS) BARREL LOCK  
FAILURE MODE: BARREL LOCK FAILS IN ONE POSITION

LEAD ANALYST: L. GRAHAM SUBSYS LEAD: S.K. SINCLAIR

BREAKDOWN HIERARCHY:

- 1) CREW EQUIPMENT
- 2) COAS
- 3) BARREL
- 4) BARREL LOCK
- 5)
- 6)
- 7)
- 8)
- 9)

CRITICALITIES			
FLIGHT PHASE	HDW/FUNC	ABORT	HDW/FUNC
PRELAUNCH:	/NA	RTLS:	/NA
LIFTOFF:	/NA	TAL:	/NA
ONORBIT:	3/3	AOA:	/NA
DEORBIT:	/NA	ATO:	/NA
LANDING/SAFING:	/NA		

REDUNDANCY SCREENS: A [ ] B [ ] C [ ]

LOCATION: CREW MODULE  
PART NUMBER: V620-660825-003

CAUSES: SHOCK, VIBRATION, MISHANDLING BY CREWMAN

EFFECTS/RATIONALE:

COAS BARREL WILL BE UNABLE TO ROTATE REQUIRED 10 DEGREES FOR SHIFTING FROM OVERHEAD WINDOW OPERATIONS TO FORWARD WINDOW OPERATIONS OR VICE VERSA. THIS WILL RENDER THE COAS UNUSABLE FOR IMU ALIGNMENT, EXCEPT AT THE SOLE WINDOW OF THE COAS SETTING. CREWMAN CAN MANUALLY CORRECT FOR THE BARREL MISALIGNMENT.

REFERENCES: V620-660810, SSSH 9.5

**APPENDIX D**  
**POTENTIAL CRITICAL ITEMS**

**APPENDIX D**  
**POTENTIAL CRITICAL ITEMS**

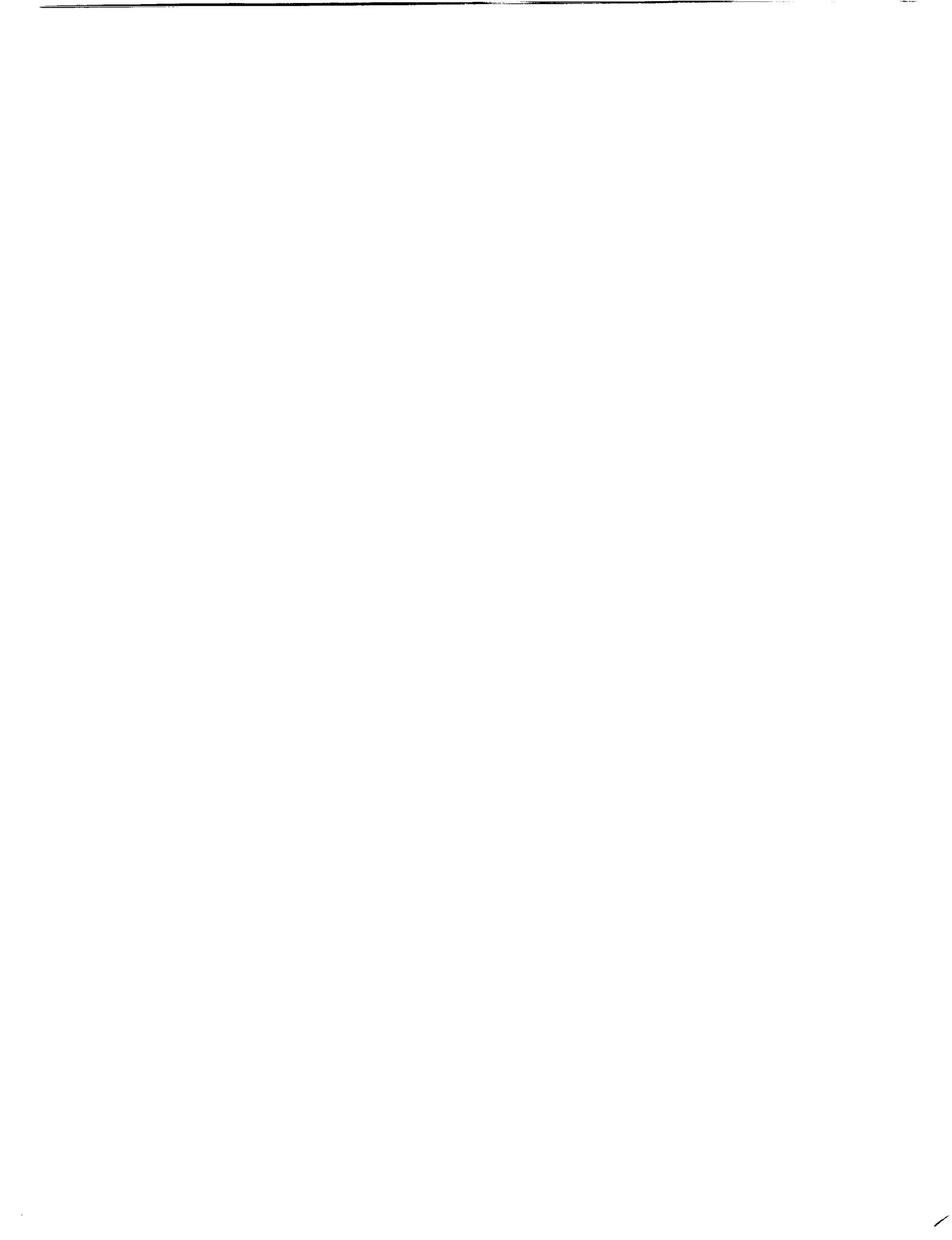
MDAC-ID	FLIGHT	ITEM	FAILURE MODE
2101	1/1	EVA SLIDEWIRE ASSEMBLY-SLIDE	STRUCTURAL FAILURE
2103	2/2	EVA SLIDEWIRE ASSEMBLY-STOP	BREAKS FREE
2104	2/1R	EVA SLIDEWIRE-END FITTINGS	STRUCTURAL FAILURE
2105	2/1R	EVA SLIDEWIRE ASMBLY-COTTR PIN	STRUCTURAL FAILURE
2107	2/1R	EVA SLIDEWIRE ASSEMBLY - QD PIN	FAILS TO OPEN
2108	2/1R	EVA SLIDEWIRE ASSEMBLY-SUPPORT	STRUCTURAL FAILURE
2109	1/1	EVA SLIDEWIRE	STRUCTURAL FAILURE
2200	1/1	ERCM TETHER-SMALL HOOK	STRUCTURAL FAILURE
2203	1/1	ERCM TETHER-CABLE	STRUCTURAL FAILURE
2204	1/1	ERCM SAFETY TETHER-CABLE ATTACH POINTS	STRUCTURAL FAILURE
2205	1/1	ERCM TETHER-REEL CASE	STRUCTURAL FAILURE
2212	1/1	ERCM SAFETY TETHER-"D" RING	STRUCTURAL FAILURE
2300	1/1	WAIST TETHER-HOOKS	STRUCTURAL FAILURE
2303	1/1	WAIST TETHER-HOOKS	INADVERTENT OPENING
2304	1/1	WAIST TETHER-NOMEX WEBBING	STRUCTURAL FAILURE
2305	1/1	WAIST TETHER-NOMEX WEBBING	FAILS TO TEARAWAY AS DESIGNED
2306	1/1	WAIST TETHER-NOMEX WEBBING	TEARS AT ATTACH POINTS
3100	2/1R	TUBE CUTTER CUTTING WHEEL	STRUCTURAL FAILURE
3101	2/1R	TUBE CUTTER CUTTING WHEEL	PHYSICAL BINDING/JAMMING
3102	2/1R	TUBE CUTTER CUTTING WHEELSLIDE	PHYSICAL BINDING/JAMMING
3103	2/1R	TUBE CUTTER RATCHET WHEEL	PHYSICAL BINDING/JAMMING
3104	2/1R	TUBE CUTTER SMALL RATCHET ASMB	FAILS TO OPEN/CLOSE
3105	2/1R	TUBE CUTTER SMALL RATCHET ASMB	FAILS TO REMAIN OPEN/CLOSE
3106	3/1R	TUBE CUTTER PAWL	FAILS TO ENGAGE NOTCHES
3107	3/1R	TUBE CUTTER PAWL	STRUCTURAL FAILURE

MDAC-ID	FLIGHT	ITEM	FAILURE MODE
3109	2/1R	TUBE CUTTER ROLLER LINK	FAILS TO OPEN
3111	2/1R	TUBE CUTTER LRG RATCHET HANDLE	STRUCTURAL FAILURE
3112	2/1R	TUBE CUTTER SML RATCHET HANDLE	STRUCTURAL FAILURE
3203	1/1	CNTRL LATCH BYPASS TOOL LATCH	FAILS TO REMAIN OPEN
3204	1/1	CNTRL LATCH BYPASS TOOL WHEEL	PHYSICAL BINDING/JAMMING
3206	1/1	CNTRL LATCH BYPASS RATCHET HND	STRUCTURAL FAILURE
3300	1/1	3-POINT LATCH TOOL RTCHT HANDL	STRUCTURAL FAILURE
3301	1/1	3-POINT LATCH TOOL HOOK	STRUCTURAL FAILURE
3302	1/1	3-POINT LATCH TOOL RTCHT WHEEL	PHYSICAL BINDING/JAMMING
3303	1/1	3-POINT LATCH TOOL RTCHT WHEEL	STRUCTURAL FAILURE
3304	1/1	3-POINT LATCH TOOL RATCHET WHEEL	PHYSICAL BINDING/JAMMING
3306	1/1	3-POINT LATCH TOOL ROLLER SHOE	STRUCTURAL FAILURE
3307	1/1	3-POINT LATCH TOOL COMPENSATOR	STRUCTURAL FAILURE
3308	1/1	3-POINT LATCH TOOL ROLLER SHOE	FAILS TO REMAIN OPEN
3400	2/1R	EVA WINCH AND MOUNT ASMBLY HOOK	STRUCTURAL FAILURE
3401	2/1R	EVA WINCH AND MOUNT ASMBLY RTCHT	STRUCTURAL FAILURE
3402	2/1R	EVA WINCH AND MOUNT ASMBLY RTCHT	PHYSICAL BINDING/JAMMING
3403	2/1R	EVA WINCH AND MNT ASM LRG CON HND	STRUCTURAL FAILURE
3404	2/1R	EVA WINCH AND MNT ASM LRG CON HND	PHYSICAL BINDING/JAMMING
3405	2/1R	EVA WINCH AND MNT RATCHET HANDLE	STRUCTURAL FAILURE
3406	2/1R	EVA WINCH AND MNT ASMBLY ROPE	PHYSICAL BINDING/JAMMING
3407	2/1R	EVA WINCH AND MOUNT ASMBLY ROPE	STRUCTURAL FAILURE
3409	2/1R	EVA WINCH AND MNT ASM RTCHT WHEEL	PHYSICAL BINDING/JAMMING
3413	2/1R	EVA WINCH AND MNT ASM MNTG PLATE	STRUCTURAL FAILURE

MDAC-ID	FLIGHT	ITEM	FAILURE MODE
3414	2/1R	EVA WINCH AND MNT ASM GEARS	STRUCTURAL FAILURE
3415	2/1R	EVA WINCH AND MNT ASM GEARS	PHYSICAL BINDING/JAMMING
3416	2/1R	EVA WINCH AND MNT ASM PIP PIN	FAILS TO REMAIN ATTACHED
3417	2/1R	EVA WINCH AND MNT ASM ROPE SPOOL	PHYSICAL BINDING/JAMMING
3500	2/1R	EVA WINCH ADAPTER ASM ROPE	STRUCTURAL FAILURE
3501	2/1R	EVA WINCH ADAPTER ASM ROPE	PHYSICAL BINDING/JAMMING
3502	2/1R	EVA WINCH ADAPTER ASM HOOK	STRUCTURAL FAILURE
3504	2/1R	EVA WINCH ADAPTER ASM ROPE CAM	STRUCTURAL FAILURE
3505	2/1R	EVA WINCH ADAPTER ASM ROPE CAM	PHYSICAL BINDING/JAMMING
3506	2/1R	EVA WINCH ADAPTER ASM ROPE PLT	STRUCTURAL FAILURE
3509	2/1R	EVA WINCH ADAPTER ASM ROPE SPL	PHYSICAL BINDING/JAMMING
3600	2/1R	PRD ASM RATCHET HANDLE	STRUCTURAL FAILURE
3601	1/1	PRD ASM HOOK	STRUCTURAL FAILURE
3602	2/1R	PRD ASM HOOK LATCH	STRUCTURAL FAILURE
3603	2/1R	PRD ASM HOOK LATCH	FAILS TO CLOSE
3604	1/1	PRD ASM RATCHET GEAR	PHYSICAL BINDING/JAMMING
3605	1/1	PRD ASM RATCHET GEAR	STRUCTURAL FAILURE
3606	1/1	PRD ASM KEVLAR WEB STRAP	STRUCTURAL FAILURE
3608	1/1	PRD ASM RATCHET SHAFT PIN	STRUCTURAL FAILURE
3612	1/1	PRD ASM RATCHET LATCH	STRUCTURAL FAILURE
3613	1/1	PRD ASM RATCHET LATCH	FAILS TO CONTACT RATCHET WHEEL
3614	1/1	PRD ASM RATCHET ASM RELEASE	FAILS TO CLOSE
3615	1/1	PRD ASM RATCHET ASM RELEASE	PHYSICAL BINDING/JAMMING
3616	1/1	PRD ASM HOOK/WEB CONNECT PIN	STRUCTURAL FAILURE
3800	2/1R	SNATCH BLOCK ASM HOOK LATCH	FAILS TO OPEN

MDAC-ID	FLIGHT	ITEM	FAILURE MODE
3801	2/1R	SNATCH BLOCK ASM HOOK SWIVEL	PHYSICAL BINDING/JAMMING
3805	2/1R	SNATCH BLOCK ASM HOOK ASSEMBLY LATCH BLK	FAILS TO REMAIN CLOSED
3807	2/1R	SNATCH BLOCK ASSEMBLY HOOK	STRUCTURAL FAILURE
4200	2/1R	LOCKER REMOVAL TOOL	HEX HEAD IS ROUNDED OFF, UNABLE TO ENGAGE LOCKER HOLDERS TO REMOVE LOCKERS.





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